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# ASTOUNDING



SCIENCE-FICTION

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**FORCES MUST  
BALANCE!**  
OWEN WHEELER  
Manly Wade Wellman

# ASTOUNDING

## SCIENCE-FICTION

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Vol. XXIV No. 1

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# FORCES MUST BALANCE!



By MANLY WADE WELLMAN

THE Martian night could not dim the garish glory of Pulambar, City of Pleasure. Though all the rest of drought-ridden Mars struggled and schemed to gather and hoard precious water, Pulambar rose on stilts

from a silver lake, even as old Venice, jewel of Earth, rose from the salt sea. Venetian, too, were the swarms of gondalike boats—strange pleasure vehicles from Earth, brought to provide a curious thrill—which floated or plied on the

waterways. Platforms and promenades, a few feet above the lake surface, blazed with lights as bright as day. Throngs of holidaying folk strolled on foot, soared on helicopters, or rode in little purring cars, eyes beset by glitter, ears filled with music and laughter. There were theaters, cafés, museums of curiosities from every planet. No pleasure known to the universe was lacking. No person in all the city but was joyful—none but Burr Wingate.

He stood far above, his slim young body leaning easily upon a narrow bridge of metal cables—one of the many that hung like strands of a web upon the tops of Pulambar's highest towers. Above him was only the night and the two hurtling Martian moons, and beneath him, like a map, spread the roofs and walls and streets of the carnival city. The water lanes seemed no wider than his long white forefinger, the boats and the people like bobbing nutshells and loitering ants. Now and then a strain of music mounted up to him. The light of the streets was faint as it washed upward and showed his face, pale and slightly frowning.

"A long way down," he was mumbling. "The longer, the better. Here goes!"

Through the back of his consciousness raced images and memories: his childhood, wealth - pampered; his schooling at home on Earth and more recently in the Martian Government University at Ekadome; his meeting with the entirely uneducated but highly ingenious gentleman with a "mine" to sell. That had been his undoing. That, and the fact that his highly elaborate and wholly inapplicable education did not include practical, salable experience. It included lots of philosophy, but Wingate's philosophy didn't include the kind of work he was able to get as easily as it included the obvious and instant finish of death.

He placed his hands on the low railing and bent his legs for a leap.

"Wait!"

Someone was rushing along the bridge toward him. "No, you don't!" Burr Wingate yelled back, and vaulted over into the abyss. He stared down upon all Pulambar, the gleaming, churning chart. Why didn't it rush up to meet his fall? But he wasn't falling.

A hand had caught his collar, even as he flung himself.

On Earth, his weight might have whipped his rescuer over the rail and down to destruction with him. Even with the lesser gravity of Mars, Wingate weighed a good sixty pounds. Only a strong man could make such a one-handed catch and not be forced to let go. But the hand on Wingate's collar gave a powerful heave, the cable bridge swayed and swung in the height like a hammock, and the would-be suicide found himself standing on the metal cleats once more, looking into a dark, heavy face and eyes full of burning scorn. The grip on his collar shook him, as though he were a naughty child.

"Ye're a sorry fool!" accused a deep, harsh voice.

"Thanks for nothing," snapped Wingate, struggling to get away. "Take your hands off me."

"Not so fast, lad," and the fingers tightened. "I'm not letting ye jump again. It would be long before ye hit bottom."

"The time would pass quickly enough," grumbled Wingate, and the other laughed—a surprising bark of a laugh, brief but hearty.

"Come, things can't be so bad if ye can make jokes. Come, I say."

The big man shoved him along the bridge to the end tower. "My quarters are just below here," he explained. "Lucky they're so, and I went out for a walk before bed, or ye'd have been so much jelly by now. Come down and talk it out."

AN AUTOMATIC elevator carried them downward a dozen levels, and Wingate's rescuer half led, half thrust

him along a corridor and finally into a small, metal-paneled sleeping room, with two chairs and a cot. Into one chair he pushed Wingate, and, placing the other against the door, lowered his square-turned bulk into it. One hand rose to rub a heavy, smooth-shaven chin.

"Why do ye want to die?" he inquired.

"That's my business," snapped Wingate.

Black, wide-set eyes studied Wingate carefully. "Ye're young. Healthy, though soft. I'd judge ye had wealth—yer clothes are good but need pressing. That narrows down the field of reasons; on a venture, I'd say ye'd lost the wealth."

Wingate stared, then nodded angrily.

Again the short laugh, gentler. "Ye didn't think it over, lad. Suicide won't get it back."

"Naturally," Wingate snorted. "But I'm not so stuck on life that I'd take the stinking jobs they'll give a man without experience for the next fifty years, just so I can live for no purpose."

"Then come with me! If ye value life so lightly, risk it on a real venture. Be off over the fence for a new world—the newest—the planet Ulysses!"

"Ulysses," repeated Wingate, slowly comprehending. "The thing they call the Wandering World. The planet that's wandering into the System from outer space, the unclaimed, unowned world—"

Wingate knew about Ulysses, as did almost everyone on the habitable planets, and his big companion went on: "Ships from every government—Mars, Earth, Venus, the Jovian System—are going to rush for it." He grinned, as if in relish of the idea. "Zero Hour is noon, Mars time, at Pulambar day after tomorrow. Ships take off. First to reach Ulysses claims him—right of first touch, you know."

Wingate looked at the broad, vital face opposite him. "Well then?" he prompted. "Where do you fit in? What's your name?"

"I saved yer life, lad; I'll put ye on yer honor not to betray me. I'm Duke Hudspeth."

"Duke Huds—" Wingate broke off, and stared.

"Ye've heard of me, I take it. Yes, Duke Hudspeth; outlaw, vagabond, wanted on every planet, by every government police, for any one of a dozen crimes—espionage, flying without license, dueling, and so on. My secret's yers, now, and by the token ye must go with me." He paused, to let it sink in. "For I'm going to Ulysses—beating all the worlds there—I'll set foot on free, safe land, where no government can touch or trouble me. I've a ship taking off at Zero Hour, and a crew of sorts—men like me, who can't afford to lose. One more hand is welcome aboard. That's why I snatched ye back to life."

"But . . . but . . . I don't think I want—"

"No?" Duke Hudspeth rose hugely, and kicked his chair away from the door. "But I can't leave ye behind. Ye'll join me—yer word of honor this instant, or I drop ye from the bridge."

Wingate realized, in wonder, that the fit had passed from him. He did not want to die. He nodded in acceptance of the terms.

Hudspeth chuckled, and from a cupboard drew a bottle. "Drink to it, then. No Martian slop, though—this is plain, good whiskey. Hold yer tumbler steady. Now, to a winning blast!"

The spirit stung Wingate's unaccustomed palate, but it helped compose his nerves. He listened with some calm to Duke Hudspeth's lecture about Ulysses, and how to get there. Finally he ventured a question himself:

"Is it true, Hudspeth, that the charge of murder against you on Earth is really trumped up—that you killed in defense of government secrets, and that the Secret Service had to have a scapegoat—"

"I'll keep such tales for the long flight," Hudspeth broke him off. "I see

the whiskey has taken hold on ye. Sleep, lad, on that cot."

Wingate moved toward the bed. A window was open—on a sheer drop of more than two thousand feet. "Where do you sleep?" he asked Hudspeth.

"Elsewhere," was the brief response, and Hudspeth was gone. The lock clinked shut behind him.

## II.

WINGATE did not even try the door. He went to the window again and peered out. He was almost as high above Pulambar as he had been on the bridge, and there was no apparent handhold or foothold on the steep cliff of the wall.

Burr Wingate stripped a coverlid of elastic fibre, tried its spring by pulling a length between his hands. Again he gazed from the window, noted other windows below—far below, but not too far. Then from his pocket he drew a claspknife, with a blade of sharp white steel. Quickly he cut the elastic coverlid to strips, knotted them, and finally hung the improvised line from his window. The upper end he made fast to a projecting lamp bracket. Full sixty feet the elastic cord dangled, into nothingness; and he, Burr Wingate, was going to climb down and to safety.

He was no athlete, but again there was the reduced gravity of Mars to consider. His poundage was little more than a third of what it would be on Earth—the climb would be easy. Duke Hudspeth, the interplanetary outlaw, would never see him again, except in a court of law. Hudspeth had been a fool to place such trust in him, to tell all that thrilling and incriminating tale of filibustering flight. Wingate knew where a recital of the plan would win him an interested audience. Carthage Dawes, a friend since college on Earth, was connected with the Earth expedition to Ulysses. Out of the window he swung, and down the cord like a monkey.

He descended to one window—a dark one. Another sill he reached, found the room inside lighted and empty, but the window locked. Another dark window, another and another. He came to his line's end.

But beneath him showed a rectangle of light—a window, and apparently open. He swung hard upon the line. It gave, lowered him, and then drew him buoyantly up. Again he went down—farther this time—gained the sill and caught the inner frame of the window, letting go of the elastic, which snapped upward.

The room outside which he perched had four revelers for occupants. Two were flowered-headed Martians and two of them Terrestrials, lounging under the flickering light of a portable joy-lamp. excited nervously by its rays as by a narcotic. Clinging outside, Wingate tapped on the half-raised pane of glassite.

There was a startled chorus of exclamations, and someone turned the joy-lamp off. One of the Terrestrials, as beefy big as Duke Hudspeth, came and stared at Wingate. "What's up?" he demanded apprehensively.

Wingate smiled, and pointed upward with his free hand. "I'm leaving a room rather hurriedly," he improvised readily. "Too much company coming. Let me out through here."

The other grinned and helped him in—it was the kind of story that would at once reassure and intrigue such pleasure-seekers. Wingate was congratulated, given a drink of Jovian guil, spicy and bracing, and sent on his way.

Down by elevator, along the thronged street of music, light and laughter by surface car; and to the dimmer outskirts of Pulambar where, in her father's villa, he had bade Carthage Dawes good-bye.

Wingate pressed the summons button at the outer gate, and on the small oblong of the television screen appeared a pink chrysanthemum-head on robed shoulders—a Martian butler. "Yess?" he intoned in his artificial larynx.

"Burr Wingate to see Miss Carthage Dawes," replied the visitor.

"Miss Dawess iss not herre," said the servitor.

Wingate frowned. "Tell her that I must see her."

"Miss Dawess hass rreturned to herr native Earrth," the Martian assured him.

"But it's frightfully important—" began Wingate, and then the Martian's image winked out, and another head appeared in the vision screen; a grizzled Terrestrial head, that of Samuel Dawes, the father of Carthage.

"Oh, hello, Wingate," said the voice of Samuel Dawes. "You want to see Carthage? But haven't you heard? She's gone back to Earth. I was against the idea at first, but she persuaded me and the League Committee both; and now I'm proud—"

"In Heaven's name, what is all this?" broke in Wingate.

"Why, Carthage is going to command Earth's entry in that run to Ulysses!" the father informed him jubilantly. "Girl or not, she's well up to it. I've trained her myself, from babyhood. You appear stunned, Wingate."

"I . . . I am," confessed the youth.

"Perhaps you'd like to talk to her—I have her on the interplanetary televiso just now. Wait, I'll switch you on."

AGAIN a blink, a flash, a new face—a lovely, radiant oval one, with level green eyes and tawny-red hair under an embroidered fillet. "Hello, Burr, and good-by," said the voice of Carthage. "I'm off in a day for the big rocket flight of all time. The race to Ulysses, and I'm going to win—for Earth!" Her voice was not tense, but definitely excited.

"Carthage," said Wingate, "I came to tell you news of the greatest importance." He drew in his breath.

"Have you ever heard of Duke Hudspeth?"

"Who hasn't?" said the image of Carthage Dawes. "We've looked everywhere for him."

"I know. The police of every planetary government—"

Carthage's image shook her red head. "No. Whatever the charges are against him, Hudspeth is one of the greatest space-fliers in history. We don't want to arrest him. Earth would have given him full pardon to secure him as second-in-command of the Terrestrial entry."

"Hudspeth's an outlaw," protested Wingate. "And I can—"

"Hudspeth," replied Carthage, "is a gentleman. A bit unconventional, a bit too rugged an individualist—but a gentleman. If he gave us his promise to help, he'd keep it. His bad luck and bad reputation, I think, come from trusting others too much, getting into jams because of them. What do you know about Hudspeth, Burr?"

"As a matter of fact," she went on, "my only fear in this race is that Hudspeth may be flying for some other government. I feel that he alone can outrun Earth's entry—the finest ship and the best crew."

Wingate felt his lips twitching, but controlled them. A new thought struck him. He had come here to betray Hudspeth's secret, but Carthage had put a new and more favorable light on the man's character. Very well, Hudspeth would get the chance. Wingate would leave the story untold, would return and help Hudspeth as he had promised. If, as she said, he was simply an individualist in a world not suited to individualism, why, on his own new world—

"Good-by, Carthage," he said suddenly.

"But didn't you have something to tell me?"

"Not just now." Wingate managed

a grin. "You'll find out later, Carthage. Good-by."

He turned and hurried back to the street, hailed a surface car, and returned to the heaven-climbing pillar of a building where Hudspeth had left him locked in.

It took some time to find again the floor where Hudspeth's room was. Coming to it at last, Wingate tried the door that had been locked upon him; it was still locked. He sat down, with his back against it. Finally he slept.

The voice of Duke Hudspeth awakened him. The outlaw stood in a doorway across the corridor, grinning. Wingate, rubbing his eyes, realized clearly that Hudspeth's weight was largely in the chest and shoulders, and that his heavy face was not softly round, but square.

"Ye see, I didn't go far," Hudspeth told him. "I heard ye leave last night—didn't expect that, after ye gave yer promise."

Wingate dropped his own eyes, and a memory came to him of Carthage's words: *Hudspeth's bad luck and bad reputation come from trusting others too much.* Was it true, then, that his outlawry had begun because he had murdered to protect his native world's secrets, and had been made a scapegoat?

But Hudspeth was continuing. "I heard ye come back and left ye unhailed—feared police spies following. Well, why did ye do it?"

"Never mind," pleaded Wingate. "I'm sorry."

"And ye're forgiven. Come."

"Come where?" asked Wingate.

"We start at noon for Ulysses."

Wingate got to his feet, astonished. "But Zero Hour's at noon tomorrow," he reminded.

"Yes—for the governments who made the rules. But, until we win Ulysses for ourselves, we're not a government—only outlaws. We start this very day."

### III.

PULAMBAR is a pure pleasure city—not so its suburban communities. One of these, in particular, is a dingy muddle of foundries, machine shops and junk heaps. In its midst, on the day that Hudspeth led Wingate there, stood a rickety clump of sheds with, among them, a round metal-lined pit. In this metal-lined pit was set, like an egg in a cup, a battered-looking space hulk. The arrangement looked like an old-fashioned socket port, such as were used in the early days of space flying—which was exactly what it was.

As Hudspeth explained to Wingate, this primitive device was needed, for he must take off in secret. It would be impossible to use a regular skyport, with service crews and metal-plated fields against which to blast the powerful starting rockets.

"It doesn't look like a long-shot ship," observed Wingate, studying the craft.

"No more it was, to begin with," replied Hudspeth. "Just an old Lincurgus cruiser—ninety feet long, thirty-foot beam. But I put in extra engines and tanks, where the cabins and holds used to be aft, bent on new jet tubes, and bored vents for additional blasts. She'll go fast and far."

"I marvel how you kept her comfortable," said Wingate, as they approached the poised vessel.

"Who said she was comfortable? Get in."

Hudspeth opened a port, and they entered.

The control room, cluttered with control board, instrument panels and a whole forest of levers in slots in floor and wall, was some fifteen feet by twenty. Here stood four figures in coveralls. One of them, the single Martian, moved forward a pace. His bladder-body had been clamped into a steel corset, with the lowest pair of his six tentacles surgically

altered and strengthened to serve as legs.

Many Martians had been thus remodeled to a roughly Terrestrial figure, more suitable to active life than their own octopuslike anatomy.

The Martian's face, instead of features, bore only a tufted expanse of petallike tags of tissue. Just now they twitched nervously, and from among them came words, shaped by the artificial voice-box: "Captain Hudspeth . . . I am ssurrrprised. I did not expect—"

"Oh? And what did ye expect then, my friend Izd?"

Wingate had heard of Izd, most noteworthy of Martian space-engineers. Was this he? The Martian's next words answered him: "Captain, I was to make one of the crrew of the Marttian entry. You come and offerrred me an inducement . . . if I came with you—"

"I did," nodded Hudspeth. "I promised that, if ye flew with me and helped me win, ye should have more than money; a land interest on the planet Ulysses, and a nobleman's rank. And so ye shall, Izd, so ye shall."

The Martian was not mollified by so much as a pennyworth. "Captain," he pursued stiffly, "these otherrrs tell me that thiss iss not the official Terresttrial entry—"

"Who said it was? I'm flying on my own. Did I say I represented Earth, Izd? Didn't ye make an unwarranted conclusion?"

"I ssurrrmised, ssince you arre a Terresttrial—"

Hudspeth waved it away. "Independent entry, Izd. Representing the future free government of Ulysses. We're pointing for a free new world, which we'll rule ourselves. Eh, you others?"

THE three Terrestrials murmured agreement, real or simulated. The slimmest and youngest—Wingate noted

that his long brow hair was artificially waved, and that his coveralls were specially tailored, as though he were vain of his elegant figure—spoke in a cultured murmur:

"Gentlemen, I have all faith in Captain Hudspeth, or I wouldn't have signed on as his second-in-command." He seemed to feel that his presence in the control chamber gave distinction to the enterprise; as he spoke, he leaned gracefully upon a walking stick made of metal, beautifully lacquered. It seemed a strange thing for a space-officer to carry on shipboard.

"Spoken like a true heart, Mr. von Ghul," applauded Hudspeth. "What do ye say, Hiffin?"

"I say that when you bailed me out, sir, and me in clink for smuggling Jovian liquor, I promised to do whatever you asked in return," said the wiry, merry-eyed fellow addressed.

"And ye?" Hudspeth turned to the remaining man, a simple-faced youngster who was bigger even than he. A giggle was the return, apparently signifying loyalty.

"I demand to be rreleased," began Izd, the Martian.

Hudspeth, who had crossed to the table that supported the controls and was resting one hand upon it, lifted the other to bring silence. He began to speak:

"As I was telling our new recruit, Wingate, just now, we have more action than comfort aboard this ship. No televiso. No radio. No clothes but work clothes. All the food is compro-synthetic. The water will be rationed. There are only three cabins, with only one bunk in each—one watch will sleep while the other stands. All the extra space is taken up with additional engines, fuel storage, controls. Ten months of hard labor between here and Ulysses; all the fun comes afterward.

"We'll choose watches. I'll take Hiffin for engineer."

"Izd for my engineer," chimed in von Ghul.

"Wingate for yannigan," rejoined Hudspeth. "That leaves Milliford to yannigan for you, Mr. von Ghul."

The big fellow called Milliford giggled again, and Izd burst out angrily:

"I rrefuse to sserrve. Let me out of herre!"

"If ye insist," sighed Hudspeth. "But it's ever so far down. Peek out that port."

They all turned to look through the glassite. Mars was dropping miles away beneath them, a vast red terrain that bulged like a reversed saucer, streaked with canals and centered, like a target, with the blotch that was Pulambar.

"How's that for a gentle take-off?" Hudspeth demanded triumphantly. And for the first time they realized that, while he talked, his hand had rested on the starting switch.

"I touched her out of the socket as I made my speech," he continued. "Thought we'd make a leisurely ascent and clear the atmosphere just at noon. None of ye noticed—maybe my eloquence had ye spellbound. Anyway, we're far up, and without parachute or life-shell. Izd, ye don't seem to be leaving, after all. I take it ye've changed yer mind. Report to Mr. von Ghul's watch."

With a flick of his slender metal cane, von Ghul gestured his two subordinates from the control chamber. Hudspeth turned to the keyboard of the controls, and began carefully to increase speed.

#### IV.

AN ANCIENT player of baseball first pointed out that interstellar flight was a problem, not for a gunner, but for a batsman. A spaceship took off for a distant planet, but that planet was not stationary like a target; it moved, and swiftly, like a ball from the hand of a macrocosmic pitcher. Not only did

the hurtling flight of the ship, that gulped miles in a second, demand exact foreplanning; the journey of the planetary objective, sailing in its orbit, must also be considered, computed, and the two paths brought to the proper intersection in time and space. Undoubtedly this pioneer comparison helped to bring baseball slang into the science of space navigation. Thus, "strike-out" meant a fatal miss of destination: "home run," a long trip from inner to outer planets; "yannigan," an apprentice or minor spaceman, and so on.

The problem of synchronizing speed-directions for ship and planet was difficult in the extreme, where the long flight to Ulysses was concerned. Yet Hudspeth had apparently solved it, with no help from specialists or government bureaus. It was noon exactly as his ship cleared the atmosphere of Mars. He finished the most intricate of his series of combinations on the control keyboard, and straightened up.

"We're set on the groove," he announced. "No hard work now; Wingate, check this table of logarithms against the other, see if they balance all right with the chart. Hiffin, are you satisfied with the engines?"

"They're darlings, sir," replied Hiffin, and smiled as though he hoped the answer was what Hudspeth wanted. But the outlaw captain studied a series of gauges, scowled, and himself made changes.

"Watch the mixture," he cautioned. "I want no pitted tubes or sloppy combustion. Get Wingate here when he's through with the checking, and show him what to look out for."

Wingate, as yannigan for the watch, was under orders of both navigator and engineer. His first twelve hours of duty were crowded ones, and he was tired and somewhat confused when von Ghul's watch took over and released him.

Then he went to explore the rest of the ship's habitable part. There was not much to see. The control chamber was oblong, save for the curve in the outer bulkhead. Opposite this curve,

at the inner partition, a panelway opened into a narrow, metal-lined corridor. Three cabins lined the side of this corridor, all doorways at the right hand as one entered from the control chamber. The nearest to the entry would be the yannigans' cabin, occupied alternately by Wingate and Millford. The middle cabin belonged to the engineers, Izd and Hiffin. The farthest was for the commanders. Beyond, at the remote end of the corridor, was a fourth panel, closed and locked. All other space—the baggage holds, lounge, promenade—had been filled with the extra machinery needed to transform a cruiser into a long-shot high-speed vessel.

Wingate inspected his own cabin. It had one bunk, two small lockers, an outer port of clouded glassite that showed a velvet-black sky full of stars. Then he lighted a cigarette and headed for the end door.

"Douse the smoke," said a voice behind him. It was Hudspeth, who came lounging away from his tour of duty. "We've got skimpy air-fresheners, lad—sacrificed for better flight power—and tobacco is out. Ye'll learn not to miss it."

Wingate, a little miffed, dropped and trod on the cigarette.

"Pick it up and put it through the incinerator port by the control chamber door," ordered Hudspeth. "Shabby we may be, but we'll be clean."

Again Wingate obeyed. Then, walking along the corridor, he put out a hand to try the end door.

"Ye'll find it locked," Hudspeth told him. "It's the commissary—only officers allowed." Then he laughed. "But I mustn't curb you every minute, lad. Come to my cabin, and have a yarn."

WINGATE followed him into the cabin next the commissary. It was slightly larger than the other two. Hudspeth offered him the single chair and sat on the bunk.

"I take an interest in ye," he continued. "What's the saying? Save a man's life and ye owe him something. I'll make yer fortune."

"I had one fortune," said Wingate, a bit ruefully.

"I'll make ye a greater, then. Ye start this voyage a yannigan—ye'll come back a prince of a new world."

"But if we don't win the race?" suggested Wingate; and added a respectful "sir."

Hudspeth did not appear shocked by the possibility. "We don't plan to lose, lad. Meanwhile, the captain must teach the yannigan."

He talked for upward of an hour, about matters that Wingate had hitherto vaguely taken for granted, because he had only ridden, never flown, spacecraft—fuel mixtures, gravity gauges, computations of position, run and speed. Wingate found himself understanding a little, and even enjoying the lecture. Hudspeth progressed to remarks upon the particular flight they had begun. When Wingate asked how Hudspeth's plan for a new government could possibly succeed, the outlaw captain grinned as though it had succeeded already.

"Ye know, lad, how a tiny touch can balance the great weights, or disturb a balance already effected? Well, that's us. Stop and consider:

"This rush to Ulysses is done under rules that amount to a treaty, all taking off with even chances. The planets have agreed because there can be no doubts, no challenges, about the winner. Each world has too much need to win for a challengeable situation to be allowed.

"But after the race is done—think! It'll change the history of the Universe! For generations we've had a Martio-Terrestrial League to keep order in the System and in particular to frighten Venus; and the Jovian moons have made good their secession from the inner planets that colonized them. Such a set-up would have lasted for ever, with all habitable worlds spoken

for and their status clarified. But now comes Ulysses, to take an orbit right in the middle—splitting Earth and Venus away from Mars and Jupiter.

"All right, suppose Earth gets him—she can dissolve her treaty with Mars, to whom she sends food and fuel in return for a guarantee of aid against a possible Venusian attack. Or Mars wins—the Martians won't need the alliance, for with a new planet they can raise sufficient crops, colonize new lands, mine new metals, be strong enough to fend off trouble."

Wingate shook his head. "I always thought that the Martio-Terrestrial League was here to stay."

"It was formed through necessity, and that's the reason it goes on. But do Martians like Terrestrials, or vice versa? Not enough, lad. However, suppose neither Mars nor Earth gets Ulysses. Suppose the Jovian ship wins. Jupiter will have a world between Mars and Earth, with resources and position to make for a great power in the System. And if Venus gets the prize, she can build up strength and do what she's always dreamed of doing, whip and plunder every other planet that has anything worth taking."

"It sounds horrifying, captain," Wingate almost moaned. "War and trouble ahead."

Again Hudspeth spoke cheerfully: "But we're in it, too—in the race, I mean. If we get there first, declare a government, they can't say us nay. No planet can let another step in, because whoever boots us out will take over—so each planet will protect us from the others. We'll be the spoke in the wheel, disappointing all the governments, and keeping them peaceful."

It sounds almost high-minded, but too pat. Wingate could not help saying: "You can't make me believe that you're in this for your health and the System's benefit, sir."

"Did I say that I was? But yanigans mustn't admonish their superiors—the buck's passed down, and not up. Sweep these cabins and the corridor, and put the trash through the incinerator port, as I showed ye. After that, come back here with Hiffin and draw yer rations."

WINGATE'S first meal in space—he was not very hungry, even after twelve hours of work—was a pemmicanlike concentrate of beef and vegetables, with starchy dumplings for bulk and energy. The only drink was water, and not too much of that. Afterward, he slept, and when he rose to take his duties again, the ship had been gone from Mars for twenty-four hours. Although there was neither radio to hear nor vision screen to see, the travelers knew that the four government entries were now touching off from their various worlds for the flight to Ulysses. Zero Hour—and Hudspeth had beaten it by half a day. Would he hold the lead? How?

It was understood that the two watches would keep out of each other's way—the watch on in the control chamber, the watch off in the cabins and corridor. Only Hudspeth, who slept very little, sometimes wandered in while von Ghul was in charge, talking to his second-in-command, or to Izd, or Milliford.

Days passed, full alternately of toil and calm. They approached the Sun, and cut closely around it in an "out shoot" curve, sacrificing long hours of temperature comfort to win a little extra time. Hudspeth, whose watch was on during the adventure, wondered aloud if the Martian entry would have the nerve to swing so narrowly close. He hoped not.

"We need every advantage," he kept saying. "Since we have no way of observing where our rivals fly,

we have to keep our best speed at all times. As a matter of fact, all five craft may finish within hours of each other. We're gambling on a margin as narrow as a piano wire."

Wingate learned much about the less exacting work of space flight. Hiffin, the engineer, called him a good yannigan, and Hudspeth began to trust his calculations of speed and direction. Despite the small volume of concentrated food issued daily, his enfeebled body grew broader and healthier, and he learned not to crave the forbidden cigarettes.

Beyond the Sun, a new course was laid for Ulysses, a course which took them almost within touching distance of the Jovian System, then on and on, without so much as a dust speck to attract them in space. Hudspeth finished the delicate adjustment of the control keys.

"I'm proud of these last calculations," he announced to Wingate, who was helping him with tables of figures. "Ye see, in computing the time, and also the position of Ulysses at the end of that time, I did what no other skipper is doing—laying my course a whole day early. We left ahead of the others, ye remember. And it takes a mathematical head. Now, before we finish checking, go to Mr. von Ghul, and ask him to give ye the slide rule that lies on the table in the officers' cabin."

Wingate went obediently through the door into the corridor. The door of the cabin shared by Izd and Hiffin was closed tightly, while the other two—the officers' and yannigans' quarters—stood open and empty. Wingate went to the door that led to the commissary, half doubled his fist to knock, but thought better of it. Hudspeth had impressed upon him the sanctity of that compartment. He would wait for von Ghul to come out. He fell idly back along the corridor, opposite the closed door to the engineers' cabin.

His thoughts were on Carthage Dawes. What would she think if she knew he was one of this ship's party—learning a space-hand's job under Duke Hudspeth?

"I can't say how glad I am that you've taken this step."

It was her voice. Here, on the ship, almost at his elbow. Wingate felt his mouth grow dry, and a pulse leap up in it. Had his thoughts been so deeply of her that he had actually imagined hearing—

But there, Carthage was speaking again:

"Go on, in the way you've begun. Carry out the work and you can ask me for anything in all the Universe."

Her voice came from behind the closed door.

## V.

FOR A MOMENT Wingate stood still and stared, wondering if he were mad or dreaming. At the end of that moment, the door flew open without warning. Wingate actually thought to see the oval face and direct green eyes of Carthage Dawes.

But it was the face of von Ghul that appeared. The second-in-command glared, and his knuckles whitened as he gripped hard the metal cane he always carried.

"What are you prowling here for?" challenged von Ghul, lifting the cane. Wingate expected to be struck. From the cabin glided two other forms—chrysanthemum-headed Izd to Wingate's left elbow, and huge, simple Milliford to his right. The three hemmed him against the wall.

"I . . . I was looking for you—" Wingate replied, trying to fight the stammer from his voice.

"Yes?" snapped von Ghul. "Why aren't you in the control chamber, at work?"

"Captain Hudspeth sent me . . . for a slide rule."

A grin replaced the glare. Von Ghul was trying to achieve calm, too. "Oh?" he said. "Why didn't you say so instead of startling us? Come to my cabin." Von Ghul searched out the rule and handed it over. His gaze was less hostile, but still suspicious.

As Wingate returned to Hudspeth, he snatched a quick glance into the cabin whence Carthage's voice had seemed to come. Izd sat within, on the bunk, and Milliford lingered at the door. There was no one else. Mystification and panic fought for mastery of Wingate's mind. When he gained the control room again, his hand trembled so that he almost dropped the slide rule.

"Have ye seen a ghost, lad?" inquired big Duke Hudspeth. "Ye've taken a long time at yer errand. Copy these figures as I read them off."

Twice in his agitation, Wingate was forced to ask for repetitions. Hudspeth paused in reading to study the yannigan. "What's up?" he demanded harshly. "Ye've gone stupid. The reason, lad—out with it!"

Wingate dared not glance toward the door to the cabins; yet something told him that von Ghul watched and listened there, his hands crossed upon the knob of the metal cane. "Not so loud, sir," he begged in a whisper.

"Come on, speak!" insisted Hudspeth.

"If you'll only wait, sir, until we're off watch; it's something of importance, and strange—"

Hudspeth seemed suddenly to understand and accept. "Very well, then," he agreed softly. "We'll drop it until later. Now, pay better attention to my readings."

And that was all that was said on the subject until the watches changed. Wingate turned over his routine work to Milliford, who was silent but

prone to eye him sidelong. As Hiffin, turning over the engines to Izd, approached the corridor door, von Ghul stopped him and spoke to him softly but emphatically. Both their glances turned briefly upon Wingate, who felt more nervous still.

Hudspeth, brushing against Wingate, muttered: "My cabin—fifteen minutes."

DURING those fifteen minutes of waiting, Wingate heard von Ghul's watch settling to their work without further suspicious activity. Finally he went to Hudspeth's cabin; Hiffin gazed suspiciously from his own quarters as the young man passed. Hudspeth looked up, waved his visitor to a seat on the bunk, and himself occupied the chair next the doorway, so that his eye could command the corridor.

"Since ye spoke of strangeness, I noticed it in the atmosphere," he said, not too softly to make Hiffin realize that they were being secret. "What's going on, lad? Quick."

Wingate told him. Hudspeth listened without word or change of expression. When the story was finished, the captain scowled.

"Those three are all in it, and Hiffin, too—the rig must be where he knows about it, so they wouldn't leave him out—"

"What rig, sir?"

"Ye heard the woman's voice. Ye recognized it. She's the skipper of Earth's entry. What was it she said, once more?"

"I haven't forgotten that." And Wingate quoted: "'I can't say how glad I am that you've taken this step. Go on, in the way you've begun. Carry out the work and you can ask me for anything in all the Universe.'"

"In other words, she was bribing them," nodded Hudspeth. "They're in her pay—all but yerself, lad. Four to two against us; but, if ye stand by me—"

"I will, sir," assured Wingate. Suddenly he felt deep loyalty to the big outlaw, and dependence upon him. "But how did I hear her voice?"

"How but by radio, probably a televiso. I fitted the ship without one, but von Ghul, whom I trusted, must have put it in—it wouldn't be difficult. With Hiffin and Izd both won over, he planted the set in their quarters. And when she gives the word—"

It was coming clear in Wingate's mind. Carthage had known, somehow, that Hudspeth would be a rival skipper in the race, though probably she did not guess that he flew for his own fortune. And she had freely admitted that she feared him more than any other opponent. Von Ghul had known this—must have conspired with her, before the take-off, to betray his captain. "When she gives the word?" he prompted. "What then?"

"For mutiny. Our finish," was the ready reply. "We'll be defeated, probably arrested. Execution for me; the stars know how many killing charges are against me in every government book. Ye'll get off alive. The others, for selling us out, will be pardoned and rewarded."

"We'll stop them," said Wingate, with more steadiness than he had expected his voice to manage. Hudspeth grinned.

"So we will. Listen: Tell Hiffin to step in here. I'll keep him for twenty minutes. Find that set in his cabin, that televiso. Learn what ye can about it. And we'll go on from there."

Leaving, Wingate passed the word to Hiffin. As the wiry engineer went into Hudspeth's cabin, Wingate slipped into the cubicle Hiffin had left.

Every nerve hummed in the youth's body. He had a sense of awkwardness, of danger. What if Hiffin returned and caught him? But Hudspeth had promised twenty minutes' freedom. Well, what about von Ghul leaving

the control chamber on an errand? Or Izd, or Milliford? Wingate banished the thoughts, bent and looked under the bunk. Nothing.

There were few hidden corners, and he investigated them all. Then he tried the doors of the two lockers. Both were fastened, but the keyholes bespoke simple locks. From his pocket, Wingate drew his claspknife, one blade of which was a long, tough needlelike probe. With it he dug into the keyhole, found a yielding mechanism, and forced the door open. The interior held odds and ends of Martian personal property—it must be Izd's locker. Closing it, he forced his way into the other. At its back, half concealed by a jumble of clothing, was a rectangle of smoky glassite. Unmistakably, it was a television screen.

PULLING away Hiffin's clothes, Wingate found two dials at opposite corners of the glassite rectangle. They were tuned, apparently to a certain wave length—to that of Carthage Dawes' set. But Wingate knew he must be sure. He pressed the power button.

The vision screen lighted at once. He saw the interior of a metal-lined cabin, and the head and shoulders of a human being—Carthage Dawes—as though he faced her at a desk where she worked. After a moment, her green eyes looked up.

"Yes," she said, "what is it?" Then her imaged eyes widened. "Why it's Burr Wingate! Then they didn't deceive me, after all!"

She sounded pleased. Wingate mumbled: "Yes, Carthage. I'm on Hudspeth's ship."

"So von Ghul said, but I thought it was some farfetched joke. Well, since you're tuning in on me, I suppose you've joined the others in my scheme?"

"Yes," said Wingate again. "I've joined." He had once been a more facile liar than he felt himself now.

The girl was smiling by now. "And you'll help all you can? Sabotage Hudspeth's unauthorized, trouble-making entry? Burr, I begin to have hopes you'll amount to something. And you've joined just in time, haven't you?"

"Just in time?" he echoed stupidly.

"Of course. Don't you know that when von Ghul comes off watch, he's going to . . . hold on! Are you really in this plot, Burr, or—"

Nervously, he clicked off the power, slammed the door of the locker, and left the cabin. He heard Hudspeth and Hiffin chatting, apparently about old smuggling days in which they had been associated. Walking to the door, Wingate saluted.

"Captain Hudspeth," he said formally, "I wish to report that the . . . the matter you asked me to look into is exactly as you surmised, sir."

"It is?" rejoined Hudspeth, with the utmost of good-humored calm. "Thank ye, lad. Ye're turning into a good yannigan. Isn't he, Hiffin?"

Hiffin nodded and smiled. "A fine one, sir. What was the job he just did so well?"

"A routine mechanical check-up," Hudspeth lied readily. "If his figures agreed with mine, I told him, he'd be working correctly. Anything else, Wingate?"

Wingate hesitated a moment, wondering how to pass on more information. "I'll put it this way, sir. When the next watch changes, those calculations we talked of are due to come to a climax—"

"What's this?" spluttered Hiffin, suddenly and sharply. "What about the next watch changing? What are you two driving at?"

"Nothing of any consequence," Hudspeth assured him gently. "Keep yer seat, my friend. Keep it, I say!"

Hiffin had started to get up, when Hudspeth, cat-quick for all his size, sprang forward and thrust him back into the chair. As the engineer's

mouth flew open to shout, Hudspeth's hard hand clamped over it.

"Strike him on the head, lad." Hudspeth quickly ordered Wingate. "No, not with yer hand—with that wrench on my cot. Hard, now! Well done! I couldn't have bettered it myself. Now, we'll lock him in here, and go plot-nipping."

## VI.

ONCE OUTSIDE the cabin, Hudspeth snapped the automatic lock shut. He faced Wingate. His eyes danced in his heavy, alert face, as though he were greatly entertained.

"We've no arms, lad. They, planning trouble, must have fighting gear of some sort. Even with Hiffin out of it, they're three to our two. But ye'll pull yer weight, and I . . . I'm Duke Hudspeth."

He said it with conscious pride, as he unlocked the door at the end of the corridor, where food supplies were kept. Beckoning Wingate to the threshold, he pointed to a great stack of tins, parcels and flasks.

"That's a full half of our rations. Carry it to the incinerator panel beside yer own cabin and fling it through."

"Destroy our food?" gasped Wingate, uncomprehending. "Why?"

"Do as yer told. I give ye ten minutes. Then come to the control chamber. I'll be talking to von Ghul—to call him that Hiffin wants him. Get his attention away from the control board."

"Yes, sir." Wingate felt his confidence return, full and strong. If the outlaw captain's tactics were too deep for his understanding, they would be too deep for von Ghul's, as well. Hudspeth turned and strode away to the control chamber, and Wingate began to load his arms with the containers.

He did the job in ten minutes—a ton of foodstuffs, transported a hundred-weight at a time and flung into the

chute that led to the destroying fires of the rocket blasts. At the end, he was winded and weary, but he must hasten and carry out the rest of Hudspeth's order. He went to the control chamber door, and looked through. Hudspeth talked to Von Ghul at the controls, and beside the fuel-gauge board Izd and Milliford noted down figures and carefully turned dials.

Wingate steadied his voice and raised it:

"Mr. von Ghul! Hiffin's in his cabin; he asks if you can come."

"What?" The second-in-command turned from the control keys. His eyes and hands were away from his work. "If Hiffin wants me, he can come here, not issue orders to his superior officer—"

Hudspeth sprang. A thrust of his huge shoulder sent von Ghul staggering away. The captain's hands fell upon the row of keys like a frenzied organist's. He struck a great combination of powers, so that the ship trembled and hummed in flight. A second later, he had caught up a loose lever handle and was battering at the keys.

"You fool!" squealed Izd, turning from his gauges, every petal on his head standing erect. "What iss it? Arre you wrecking the sship?"

"No," panted Hudspeth. He fitted the lever to its socket, shoved it down, and wedged it into immovability with a shoving kick of his boot heel. He turned triumphantly to face the others.

"Not wrecking the ship—only keeping ye from wrecking it! Yer mutiny's gone to seed. I've jammed the ship on her course; it'll take weeks to mend the controls. And then it'll be too late."

"Never think it," snarled von Ghul. His metal cane whizzed in the air. Hudspeth snatched at the end of it, and a moment later it seemed to come away in his hand—but it was only the shank of the cane, like a loose sheath. Holding to the handle,



von Ghul cleared a concealed steel blade from inside.

"Sword cane!" yelled Wingate warningly.

"Get that yannigan!" von Ghul ordered Izd and Milliford, who rushed on Wingate. At the same time, von Ghul attacked the captain with his bared blade.

BUT Hudspeth, swifter than the slim von Ghul for all his brawny bulk, had parried two thrusts with the cane shank he still held, and sped a return blow. By skill or chance, that riposte landed full on the eye of the



sword wielder, bringing a spurting gush of blood. Von Ghul swore, staggered, and sprang backward. Hudspeth, ducking under the wavering point, closed with him.

This much, happening in half a moment, Wingate saw even as Idz's throttling tentacles whipped around him and Milliford's big, clumsy fists began to hammer his face. Wingate fought back, not very effectively, then went down. Blows showered upon him, but suddenly ceased.

The weight of his enemies rose from him. Hudspeth was driving Idz and

*"There won't be any turning back now," Hudspeth roared. "Ye won't fix those controls this day!"*

Milliford back, at the point of the cane blade he had wrested from von Ghul.

"Back!" he growled. "Back, or I'll lance the two of ye, and let a few gallons of cleverness out! That's better. Go and wash von Ghul's face. He's had enough, too."

Sure enough, the leader of the mutiny sprawled and moaned beside the jammed control mechanism. The

eye which had escaped the rapping slash of the cane shank had been blackened almost to the chin, and the mouth had been cut and smashed by a powerful blow. Crestfallen, Milliford and Izd went and stooped above him, while Hudspeth hurried to the fuel gauge. He twisted a dial quickly, studied the result on the instrument panel, and laughed aloud.

"See!" he cried. "There goes our return load of fuel!"

"We'll be losst," gurgled Izd, even his artificial voice growing hysterical. The mutineers looked as though they were rallying for another attack.

"Stand easy," Hudspeth warned them merrily. "The fighting's over. We'll ride lighter and go faster. But no mutiny can help. Is that an electro-automatic pistol ye're fumbling for, Milliford? Hadn't time to draw it up to now, did ye? Well, hand it over to Wingate. Izd can do the same with that gun that makes a lump under his coverall.

"For there's only fuel enough to get us to Ulysses. Yes, and only food enough. I put in return supplies—but I've dumped them. And the controls, as I fixed them, can't be repaired so that speed can be checked or direction changed until it's too late to turn back."

Von Ghul sat up and stared. His bruised face was stamped with horror and embarrassment. The two others meekly surrendered their weapons.

"Do you realize, captain," said von Ghul shakily, "that it'll be almost impossible to survive if we don't reach Ulysses."

"It'll be entirely impossible to survive if we don't reach Ulysses—and first." Moving to Wingate's side, Hudspeth took one of the electro-automatics. "Attention, all hands. I'm going to tell ye a story—the first time I've ever told it, and I hope the last.

"Once I was a captain of the World League's police. A Martian spy came to steal a government secret—which still remains a secret, so far as I'm

concerned—and I killed him. Did it with a single grip and twist—as I might do to Izd yonder. Saved the secret. But Mars began to inquire. If the truth were told, there might be interplanetary trouble, and the treaty in danger; so, to keep things friendly, Earth let 'em have a scapegoat. Me."

Hudspeth's face grew dark, drawn. "I started to Mars on a prison cruiser. Midway of the run, I took that cruiser from my guards—as you tried to take this ship from me. I went back home. But Earth, fearing because I knew that secret I'd killed for, and misjudging that I might tell it, trumped up a charge against me.

"I flew to Ganymede. A Jovian operative tried to betray me for the reward. He'll never betray anything again. I went to Venus. They tried to make me a spy against Earth—condemned me to death when I refused, but I cut my way out of their prison with a makeshift ray-thrower. Since then I've been smuggler, thief, pirate. All the police forces of all the planets are hunting me. And—here I am.

"That's the truth. I tell it, not to make ye mourn for me, but to show I won't be taken or balked—not even slowed up. Ulysses is going to be my own world, where I can rule, live, be safe from everything. Ye've tried to break faith with me—but ye'll all keep faith now. I dare any of ye to mutiny again!"

He drew a long deep breath, and glared. "Am I clear? Do ye know a licking when ye've had it?"

It was plain that they did.

"Then back to yer posts! As ye were—and carry on!"

HUDSPETH and Wingate turned toward the cabins. "What will you do with them, sir?" asked Wingate softly.

The captain actually chuckled. "What Lincoln wanted to do with

some other rebels, more than a thousand years ago. Remember his words? 'I'll deal with them as if they had never been away.' I need them on the rest of the voyage, and they've learned their lesson."

"But they're faithless—they tried to sell you—"

"And so did ye once. But ye stuck by me this second time. Let's go to that hidden televiso ye dug up."

They went, and none stayed them—considering that the controls were jammed almost irrevocably in place, von Ghul's watch seemed to be finding much work to do. In the engineers' cabin, Wingate forced once again the lock and revealed the vision screen. A touch of the button, and Carthage's face appeared to them.

"What's happened?" her impatient demand came to their ears. "I've been signaling and signaling—Burr! You again?"

Wingate bowed to her reflection, as though he was in a drawing room with her. "Me again," he said. "Allow me, Miss Dawes, to present Captain Duke Hudspeth."

"A pleasure," chimed in Hudspeth, with a courtly bow of his own. "I'm sorry, ma'am, to report that yer mutiny plot is off the mound. I've stopped it, struck it out—and there'll never be another."

Carthage's green eyes frowned. "It . . . is it possible? But . . . Captain Hudspeth . . . perhaps you and I can agree—"

"If ye mean to suggest that I can be bought off," interrupted Hudspeth gently, "the answer is 'no.'"

Carthage was looking again at Wingate. "Burr," she appealed, "you once said you'd do anything for me. This flight—and the victory—means so much to Earth. If you could persuade your captain to stop this unauthorized venture that may bring interplanetary war—"

"Carthage," said Wingate, "I can't be tempted or tricked. Good-bye.

When you reach Ulysses, we'll be waiting to welcome you."

He shut off the power. When he turned to Hudspeth, the outlaw captain was holding out a big hand.

"Congratulations, lad!" he cried. "And I'll call ye lad no more, for ye're a man. Ye uncovered the plot, ye stood by me to fight and win against odds, and just now ye refused to be bought or blandished by the girl ye love. Of such stuff are proper men made. I'm proud to call ye friend—and my second-in-command!"

"Second-in-command?" echoed Wingate.

"Right. I've spared von Ghul, but I won't ever trust him. Ye've learned enough and to spare about space-flying. So ye go to head of the watch—Hiffin drops to yer place as yannigan—I take von Ghul for my engineer. Go and relieve him, while I let Hiffin out and let him know what's gone on since he dozed off."

## VII.

MONTHS of time, millions of miles, had gone by. The sun lay far on the back trail, a small and bitter-bright point in space. No worlds showed themselves against the distant velvet depths of heaven. But up ahead loomed, a great round blob of gray-green—Ulysses—the goal toward which five racing ships strained every atom.

Farthest back was the Martian entry; something was wrong with the tube metals, and they had become pitted, erratic. Well ahead of Mars, in fourth place, soared the ship of the Jovian League, the hardy crew trying to make up in spacemanship what it lacked in equipment. Next, almost side by side, and not more than two miles apart, strove the lean silver cigars of Earth and Venus. And ahead of all went that strange outlaw vessel, flown by apostates and renegades and commanded by a man wanted for crimes on every planet—Duke Hudspeth.

But Hudspeth did not hold his lead. He slipped back, and back. Venus and Earth, full of inspired hope, coursed after him, up to him, past him. He fell whole seconds behind, then held his third place, as if content with it.

Why?

The Jovians wondered, the Terrestrials wondered, the Venusians wondered, the outclassed Martians wondered; and, in the control chamber of the slowing ship, Hudspeth's young lieutenant, Burr Wingate, wondered. He said so.

"If I didn't trust you, sir," he told Hudspeth, "I'd think you had lost your wits, or your nerve."

Hudspeth was managing the repaired controls with agile, knowing fingers on the keys. "We'll win," he promised. "We can't help but win—after slacking off like that."

"But how—"

"I'll put it in two short, well-chosen words: 'Ware Venus!'" said Hudspeth. "Ye still don't understand? Do ye know Venusians?" The captain's heavy face seemed to reflect grim old memories. "They're a bad lot, Mr. Wingate. As bad as the Universe affords. Have on yer old clothes when you cross a Venusian—because it means trouble. And that Venusian ship yonder will stop at nothing to win."

"You're sure enough of that to relinquish your lead?" asked Wingate.

"Look, and ye'll make out weapon ports on her," was the reply. "Why is a racer armed for space-fighting? Answer me that."

Wingate studied the televiso—it had been brought from Hiffin's locker into the control room. He nodded.

"I see what you mean. But, if we fall back now, what about the finish? It's nearly at hand. Won't Venus keep the lead over us—and won't Earth hold the same lead?"

"Neither will hold a lead. For Earth is the big threat now. Those Venusians will ray out the Terrestrial entry. That will take moments, though. And

we'll whip by, get a safe lead, slide home—"

Wingate suddenly was not listening. Even as he stared into the vision screen, he saw that Carthage Dawes and her ship were in dire danger.

The televiso viewpoint rode above and abreast of the two leading craft. The Venusian entry was at the left of Carthage's ship; and at the right side of it little black rings—two, three, four—became visible. Ports were opening.

"Ware Venus!" cried Hudspeth. "Watch for MS-rays!"

He cut his own speed a trifle more, with definite determination to remain clear of any violence. As he spoke, lean streaks of silvery flame gushed from the ports of the Venusian ship, reaching for the rival like vicious tentacles—and falling short.

For Carthage had suddenly fired her upper nose-rockets, sliding down even as she went forward. The rays flashed over her, finding no immediate target. "Strike one," breathed Hudspeth, craning his muscular neck to see.

"She's doomed," Wingate said nervously. "She's unarmed—"

"No, she isn't," Hudspeth cut in. "Watch."

As the Terrestrial ship fell away below the Venusian, it seemed to spout forth bright bubbles, that sailed upward as if with life and knowledge of their own.

"Roving bombs," said Hudspeth.

Apparently Carthage had come prepared for trouble, too. One of the bombs, radio-driven and guided, flew full at the rear group of Venusian rocket tubes, and the attacking craft had to dance in space to avoid its blast. Another bomb exploded in front of the attacker's nose, with a brisk force that must have made the forward ports creak in their stout frames.

"Well done," applauded Hudspeth. "Wingate, yer lady friend isn't going to go down without a fight."

"We've got to save her," Wingate said desperately.

"Yes? How? We've no weapons, not even one ray-thrower."

"We must."

HUDSPETH shook his head, eyes grave. "I know. Ye love her, though she insulted ye and endangered ye. But—"

"We might blast that Venusian with our rockets," broke in Wingate. "Look, those rays are going to catch her!"

Carthage's ship jumped and lurched like a salmon in a freshet, but not quite soon enough. The Venusian's rust-ray flicked across the flank of the Terrestrial ship, and a long red-brown wale showed there. Carthage tried to run, the Venusian closely pursuing. The next slash of the ray would seek to cross that first wound. At the junction of the lines the hull, doubly assaulted, would burn through. Air would escape—gravity-balance would depart. A third stab of fire would finish the ship, and Carthage, and all.

"I hate to see it," Hudspeth muttered. "Even though she tried to do us in, I hate to see it."

"Give me the controls," begged Wingate.

"Ye saved this craft once. Do ye want to destroy her now? But take over." Hudspeth had been watching Wingate, and seemed to change his mind. "I trust ye."

Wingate did not pause to thank him, but fairly hurled himself into the control position. His eyes were riveted upon the vision screen. His hands, made skillful by long hours of steering under Hudspeth's guidance, struck the "full speed ahead" combination. The ship put forth every ounce of forward power, swooped upon the struggling pair ahead.

The Venusian's rays prodded for the enemy, found a target, traced a blazing streak at right angles to the first one. It crippled Carthage. She still fled, but clumsily. Within seconds, the third and fatal flick of the ray would overtake her. The Venusians must have been fiercely exultant, already counting victory theirs. They could hardly have known what rushed upon them from behind.

Wingate drove after the Venusian—over its back—beyond. A touch of controls, and he fell a little in his bullet-swift course, so that he flew directly in front of Carthage's foe. When the ship was aware of him, it might have tried to get away; but it was too late.

For, without cutting his rear blasts, Wingate fired every rocket at his bow. The ship vibrated, her last atom of metal sang and shrieked, as though the plates would buckle, but the stout, old over-braced freighter hull took it, gushing fire fore and aft.

The Venusian ship was suddenly in the heart of the great flaming blossom that was Wingate's full rocket-gush to the rear. Not even plate of proof, trebled and insulated and braced, could stand that direct impact of pure heat. There was a deeper, redder glow, and a sideward bounce, like a football badly kicked.

The destroyer was paralyzed, gutted. Port panes were driven in, plates were sprung. After one moment of agony, the crew which had thought to visit death on others was itself ashes. The Terrestrial ship, that had seemed doomed, was slipping ahead toward Ulysses.

But the Terrestrial was not first among those that remained. Far ahead of it went the entry of Duke Hudspeth, already cutting blasts to enter the atmospheric envelope of the new world that awaited a ruler.

## VIII.

IT WAS not too pleasant a landscape on which Hudspeth was setting down his ship. The soil was brown and bare, sloping away to a sea of ice on one hand, and lifting on the other to a horizon of sharp mountains. The sky was blue almost to blackness, and the far-away Sun gave somewhat more light than Earth gets from her Moon at its fullest. There was no motion or color of life. But Hudspeth smiled with relish as he listened to Wingate's report of the air tests.

"Nitrogen, oxygen, water vapor," reported the second-in-command. "Yes, and carbon dioxide, though there isn't any vegetation in sight."

"There was vegetation once," said the captain confidently, "and there'll be vegetation again. Trees, wheat-fields, garden patches." He was silent for a long minute, as he set the ship down. "Break out the furs and woollens, gentlemen. It'll be a cold first day, but as we come toward Old Sol we'll be warmer, warmer—take sun baths, swim in the melted ocean—live like the kings we are."

He was first out of the opened sally-port. His boots made flat clapping noises against the frozen soil. He raised his voice in formal pronouncement:

"I, Duke Hudspeth, hereby take executive possession of this planet, Ulysses, as my own personal domain and that of my heirs to follow, free of all governments and rules beside my own!" Then he turned to the others. "Out ye get. A poor thing, but our own, this world—and it'll be a rich thing in good days to come. Von Ghul, take Milliford and slide up to those mountains. That scuttled Venusian ship will come drifting in. We'll mark its landfall, and salvage whatever we can, for we are short on food and other things."

Wingate was the last to emerge. He had checked all instruments. "Atmospheric pressure's light, but the extra oxygen makes it healthful," he commented. "As we come toward the Sun, that light envelope will let through the heat we need, as much as Earth gets, once we slide past Jupiter, and our orbit's broken. Look, there comes Carthage Dawes!"

The Terrestrial ship was dropping down in slow spins, like an autumn leaf, carefully seeking a landing near Hudspeth. The three who remained near their own craft waited, curiously and somewhat tensely, until the other ship was down and opening its port. A slender figure, muffled in cloak and hood of thick fur, quickly emerged.

"It's Carthage," muttered Wingate, and Hudspeth stepped forward.

"Welcome, Captain Dawes," he called out. "Ye have my leave to land."

Carthage walked toward them. Her face—what could be seen of it under the muffling hood—was a trifle perplexed. "I don't know how to treat you," she confessed.

"Treat us with good manners," suggested Hudspeth, "and ye can't go far wrong."

"First," said the girl, "thank you for coming to my rescue just now, when—"

"Thank this man," Hudspeth told her, laying his big hand on Wingate's shoulder. "I think ye already know Mr. Wingate, my lieutenant and secretary of state?"

He went on to tell how Wingate had evolved and put into practice the plan for crippling the Venusian. "In any case," Hudspeth finished, "our government may be in trouble with Venus over that blast-bunt. Ye will bear us out, I hope, that we saved ye? Earth will stand by us—and maybe Mars, yer ally?"

Other figures were coming from Carthage's ship—fur-clad men, with

weapons. "Everything all right, skipper?" one of them asked the girl, plainly hoping to be ordered to shoot. But she shook her head dolefully.

"I'm afraid," she said, choosing every word with slow care, "that these gentlemen were here before us. Their claim looks good to me. Let me go back to the ship, and get our government on the televiso."

She went. Wingate was aware once more of how cold and naked was the world of Ulysses. At the open hatchway of the Terrestrial ship lingered two bundled-up men with electric-automatic rifles. They looked direly anxious to shoot somebody. But Hudspeth betrayed no worry.

"Earth will never kick us loose from our winnings now," he said confidently. "Yer lady friend shouldn't be talking to her home over any radio device—for now Mars will tune in and overhear, and Jupiter's moons, and Venus. None of them will let Earth claim Ulysses."

"You mean, they'd prefer to have us run?"

"Of course. Haven't I explained how Ulysses is too great an advantage for one world? With an independent government springing up, the old status quo is maintained. Each world stands to protect us from the others. It's as I hoped—freedom, safety, and limitless concessions to make."

When Carthage came out, she announced briefly that Earth's government had recognized the sovereignty of Duke Hudspeth, and would urge other worlds to do the same.

**NIGHT FELL**—apparently Ulysses revolved once in thirty hours—and there was festival aboard Carthage's grounded ship. She graced the head of a long table in the salon, and Hudspeth sat at the foot, with the crews of both craft lining the sides. Wingate sat at Carthage's right hand, and Carthage treated him with an embarrassed respect.

"I'm king of this world," Hud-

speth said, in response to cries for a speech. "King—because I always thought that a proper king would be the best sort of ruler. The only trouble with monarchies is the individual monarchs. I hope to have sons some day, and that they'll be better kings than I. My first decree is that Ulysses will be open to settlement by any person who will recognize my authority."

He sat down amid thunderous applause.

"You've already got some settlers from my own party, your majesty," said Carthage ruefully. "Among others, my second-in-command is resigning to stay here. I hope you'll leave me some hands to work my ship back home."

"Oh, naturally," agreed Hudspeth. "Haven't ye sold us supplies on credit? Haven't ye won yer own world's recognition for us? And haven't ye entertained us as even royalty has seldom been entertained? I won't leave ye short-handed."

"But I need a lieutenant to stand the other watch." Carthage's green eyes turned appealingly upon Wingate. Hudspeth noticed, and his big face cracked across with a knowing grin.

"I'm sorry, Skipper Dawes. Mr. Wingate shall not be yer second-in-command."

"Oh," said Carthage, in plain disappointment. "I had hoped—"

"He will be my envoy to Earth, carrying greetings and treaty suggestions. I'll want some sort of interplanetary structure set up for my government by the time Ulysses comes into its orbit. But, if you carry him in your ship, I make no doubt he'll take care of a watch for ye. Yet he'll not be subordinate to ye." Hudspeth smiled from her to Wingate. "Bygones being bygones, can't the two of ye get along on equal terms? Talk it over on the return trip."

Carthage smiled dazzlingly at Wingate, who became aware that Hudspeth was drinking both their healths.

# THE LAST HOPE

*A dozen old men with weapons and fanatic ideas vs. two young people without!*

By Don Evans

## I.

THERE was a crashing of underbrush. With a magnificent bound, a fine young buck catapulted from cover and soared over the granite sarcophagus marking a grave in the overgrown clearing. It fled on into the depths of the forest at the same frightened speed. There were other sounds of something drawing nearer.

There was another crash, followed by a low-toned oath of impatience. The stalwart, muscular blond youth, dressed in a bit of leopardskin, with bow and quiver, limped from the woods painfully, rubbing an elbow with an exasperated frown.

Bow in hand, he mounted the sarcophagus, listened intently. His gray eyes were severe as his questing gaze followed an avenue of stately cedars fronting a row of mausoleums. He located the buck by the sound of its swift flight and then, leaping down lightly, took up the chase again.

At the end of a brush-grown avenue was a ruined fountain whose overflow once fed the lily basins to his left. Beyond it was a magnificent, tall, narrow structure in porphyry and green jade with prismatic windows of thick crystal. The lowering western sun penetrated the translucent tower, making a kaleidoscope of moving color where the light struck the foliage of climbing vines.

He cast a brief suspicious glance at the broken bronze doors, yawning into blackness, and gave the place a wide berth, for these ruined tombs were the

favorite haunt of leopards and other wild beasts.

The buck was now beyond hearing. The youth cursed the vine that had tripped him at a crucial moment, thus making another long stalk necessary with the buck grown alert with suspicion. With frowning gaze questing for tracks, he loped on into the gloomy depths of the forest.

The trail led in and out among granite pillars, between mossy headstones, and past marble statues peering fixedly at him from the gloom. The great trees towered above and shut off the light, their mossy boles mottled and splotched with gray-green patches of lichenlike vegetable leprosy. The air was warm and dank with the smell of lush bracken and the deep, rich, rotting mold of the forest floor.

Half a mile the trail led through the somber shades until the land began to rise, with copper-tinted sky through the trees beyond. Skirting a pyramid of black glass and green jade with trimmings of lacquered copper, the ruins of extensive hanging gardens about it, he increased his pace to a swift run, thinking to catch a glimpse of the quarry on some open hillside ahead.

But, emerging from the last of the trees with the lowering sun square in his face, he was brought up short with a cry of consternation. Shielding his eyes with a hand, he remained staring with open mouth, dumfounded and thunderstruck.

Far away across a shallow valley, he saw the tapering spires and rounded

domes of a great city thrusting into the blue. Sunlight gleamed in iridescent hues on translucent green jade and rose quartz, on dark porphyry and snowy alabaster. Tier on tier of elevated highways rose and vanished in opalescent glory. But not a sound broke the afternoon quiet, not a vestige of movement was discernible anywhere about this stupendous monument to a vanished race.

A lone buzzard wheeled in leisurely circles in the brassy air above.

He lowered his hand slowly. Dead cities he had found by the score, but no such vision as this, ethereal as a mirage on the desert. Tearing his eyes from the sight with a last thought for the buck, he swept the hillside to right and left. The immediate gentle slope falling away from his feet was dotted with row on row of crosses, hundred of thousands in neat geometrical precision. But he was used to these unending burial grounds and scarcely gave it a thought. There was no sign of the buck.

To the south, down the broad valley, a few ungainly camels were filing through a tongue of meadow between the tentacles of heavy forest. To the north, he saw a herd of buffalo on a rounded grassy knoll in the center of the valley. The horizon on every hand was all a dark line of unbroken forest.

Towering marble pillars nearby drew his attention and he picked his way through the crosses until he stood beneath the soaring curve of a great arch. Far above, on its yellowed keystone, was the single word "Elysium." A broad highway passed beneath the arch, dipped as it crossed the valley beyond, and rose again in graceful curve as it headed straight for the city. Its concrete was broken and disrupted, with brush and saplings sprouting through the cracks, but its level surface drew him on.

Fascinated by the shimmering loveliness of the dead city atop the far hills, he forgot the buck in his excitement and stepped out swiftly. His bare,

horny soles trod warily, but his long legs carried him swiftly, nevertheless, although he could seldom wrest his gaze from the spires and pinnacles ahead.

AS HE WENT, his eyes scanned the forested valley from time to time. He started as he made out a peculiar movement. With head craning forward in alert attention, he scrutinized the spot, for it was like nothing in nature he had ever noticed.

Midway of the valley was an extensive grove of dark cedars in what seemed to have been a park long before. The grove was bordered by the silver thread of a stream that meandered aimlessly through the almost flat land. Above the center of the grove, something was rising and falling in swift, rhythmic motion. It created a trembling excitement in him with its air of artificiality which suggested humans in an otherwise dead world.

The city was a good ten miles away, however, and the day was fast drawing to a close. The cirrus wisping overhead was blood red. Blue shadows clothed the dark grove of cedars to his left when he had picked his way across a ruined bridge. He saw red tiled roofs and translucent pink and rose-colored walls in what appeared to be well-kept gardens. There was a steady creaking sound coming from somewhere behind the building.

The place stirred his curiosity and he paused in indecision. There was something about the motionless, lifeless silence of the city that was ominous. As it grayed with approaching dusk, it seemed sinister. It was too far away to reach before dark and he felt a disinclination to go farther. The red tiled villa stirred his interest and bred a longing to explore.

He cast a glance back the way he had come. Beyond the lofty arch, dwindled now with distance, the highway entered another fantastic city on low hills where enormous pyramids and mau-

soleums thrust up from the encroaching forest. In the other direction, the dull-red ball of the sun was sinking in rose madder haze behind towers and domes that had blackened in silhouette.

Dusk was falling fast and he decided that he could explore the city on the morrow. Casting a dubious glance at the villa, he again felt the certainty of people about. For some unaccountable reason he shivered as he turned up a broad, white drive in good state of preservation. Brazen doors hung open invitingly in the long, low building, but an ominous feeling, steadily growing stronger, caused him to make a wary circuit of the place.

The villa was still in good condition and its translucent walls seemed to scoff at secrets. But his keen woods-trained senses seemed to feel eyes peering, watching, noting his every move. The creaking sound continued. He knew that it came from just about the place where he had seen that strange movement above the trees. He continued on through the grove by way of a well-marked path. The existence of the latter strengthened his suspicions to certainty. Only humans and animals made paths and it was not likely that animals had beaten a path to the back door of the building.

At the edge of a clearing, he stopped in suspicion at sight of a huge windmill whose arms slowly revolved in the breeze. A night-born wind was turning the vanes faster. The cool fingers of the breeze made him shiver as they crept down his naked spine. The cedars were now black and the shadows beneath them heavy. The grove was eerie.

Casting an uneasy glance about, he felt the skin prickling on his neck as it did when he was stalked by some silent predator in the forest. He debated with himself whether to remain here or not. A sixth sense warned him of something nearby, but could not tell him what it was.

A closer inspection showed him that the mill was not much like the other

building. Where the villa was old and beautiful, the mill was much newer and ugly. The first story was rough stone. Bark still clung to some of the squared logs above. It appeared to have been put together with difficulty. There was a vast difference to the artless perfection and unstudied skill of the villa.

The rugged ugliness had a friendly feeling. It was familiar to him because of the timbered hut in which he had been born and the other rude cabins he had found in the North. And there was no more time to explore before dark. He decided he might try the house in spite of its annoying creaking sound.

Its rough pine door was also open. Approaching cautiously, he thrust his head inside the door and peered about. The sense of humans alive and near was strong. But he could see nothing. Darkness was intense in the interior.

Then just as he was about to draw back in doubt and indecision, there was a whistling pop behind him, his knees gave way with a jerk, and blackness swooped down as he pitched forward.

WHEN HIS senses returned, he found that he was stretched out on something level and soft. He was first dimly aware of several blue-white globes dancing in the air above him. Then he made out curving silver handles with human hands attached. He sat up with a start.

"People," he said.

There was a murmur of comment around him.

Shaking his head to clear away the fogs, he found his eyes focusing again. He saw a rough-timbered roof above. Faces took shape, at first wavering uncertainly, then growing clearer until they had attained the fixed character of reality. He made out several gray-haired old men, dressed in skins like himself. They were grouped about him and looking down with a peculiar intentness.

It was completely dark outside now. Olaf had no notion of how long he had been unconscious. He saw that the globes gave a bright light after all, for the room was brightly illumined. The lanterns were globes of glass filled with some bluish-white radiant substance. It was a pleasant glow, but he blinked rapidly and closed his eyes. Something was still the matter.

"At least he speaks English," remarked someone dubiously.

Olaf opened his eyes and examined the speaker. He saw a tall, old man with dark saturnine countenance and snapping black eyes. They all seemed pleased about something.

"A fine specimen," remarked the tall one, holding his globe high and scrutinizing Olaf appraisingly from head to foot.

The youth, feeling heavy and inert, swung about and lowered his feet to the floor. He was on a rude wooden cot. They all backed up as though they were afraid of him.

His initial surprise at finding people had given way to a profound satisfaction. He looked from one to the other expectantly. Six, he counted, all old, grey-haired, emaciated. They were still examining him with that pleased and speculative air.

"Excellent," remarked the tall one. "Couldn't be better for our purpose. He comes of sturdy stock and has youth, health and strength.

Olaf regarded him quizzically. He felt like some dumb animal on display, or, as if the others were some queer type of foreigners who did not expect him to speak their language.

The tall, dark one had been fingering his chin judiciously. But now he glanced about with quick, nervous energy. "We will get busy at once," he decided, with a tone of authority, and motioned the others from the room.

"Wait a minute," exclaimed Olaf, starting to his feet. "What is all this about? What happened to me?"

But the men filed out without answer. One of them pushed him back at the door, which was slammed in his face and locked. It was a stout door and well set in the stone wall. There was a barred opening in the upper half through which one of the old men was still visible.

"Let me out of here," cried Olaf in alarm and tried to shake the bars. He was unaccountably weak.

"Now don't you worry," said the old man through the bars. "Nobody is going to hurt you. But you're in quarantine, you see, and you can't get out."

## II.

OLAF looked around the room. There was the cot he had been lying on, a rude table and a couple of chairs. One of the globes had been left for him. There were windows on three sides heavily barred with iron. The door on the fourth side was not the one that gave entrance to the mill. This was an inner room occupying about one third the ground floor. There was no way out save through the door where his jailer lounged.

He went close to the opening in the door and peered at the graybeard skeptically. He saw a leonine head of straggly gray hair and bushy beard, narrow shoulders, and a bit of wolfskin garment. Deep-set eyes with a haunted look, gazed back at him in friendly fashion. The old man appeared harmless, interested, and eager for company.

"It's a good thing you stopped here instead of going into Avalon as you intended," the guard informed him. "The city is full of the plague."

The youth regarded him in perplexity.

"Oh, we know a lot about you," continued the old man, enjoying his surprise. "You were born in the arctic. You haven't seen humans

since your father died. Your grandfather was a Swede, of hardy stock and used to a cold country, else you wouldn't be here today.

"He hated cities and crowds and when the wars started he got as far away from civilization as he could. Built a house seven hundred miles from the pole out of the timbers of his wrecked ship. When the plagues started, he even drove off the occasional Eskimos with a rifle. You've hunted and fished all your life, but you couldn't see any reason to remain in the arctic longer and you've been wandering south looking for humans for two years."

As Olaf stared back with amazement, the old man emitted a dry chuckle. "By the way," he added, "they all call me Johnny here. I'm the infant of the lot. You might as well call me Johnny, too."

"All right, Johnny," Olaf responded. "If you know so much about me, maybe you know what happened to me when I put my head in here?"

"Oh that," responded the other. He held up to view something that looked like a stubby, complicated rifle. "Neuroblast," he explained. "Numbs the voluntary nervous system. We thought we might have trouble with a husky youngster like you. The effect is harmless as an anæsthetic and only temporary. You'll be all right in a few minutes."

Olaf gripped the bars frowningly. His joy at finding humans underwent some modification to find that they had shot him down, taken his weapons and cooped him up here. He moved his shoulders dubiously and felt of the back of his neck where most of the numbness remained.

The old man seemed to read his thoughts. "Absolutely necessary," he said. "You came through Elysium Heights, one of the cemeteries. The very soil is alive with the plagues. If nothing develops in a week, you'll be freed and we'll be glad to have you as one of us."

A week! Olaf, used to the freedom of the forest, never having known constraint in a world devoid of humans, stared back aghast. He dimly understood quarantine. A little worried by the millions of graves he had seen since leaving the North, he supposed it was all for the best. With no desire to sleep, he felt some of the guard's inclination for company and satisfaction in conversation with another human.

The other was still garrulous. "We thought there were only twelve of us left," he said with satisfaction. "Forty years together in this God-forsaken hole! We're sick of each other. Glad to find there's someone else left in the world."

"I don't understand all this," mused Olaf. "How did you know that I came through the cemetery and that I was born in the arctic?"

The aged man surveyed him a long moment with speculative but friendly eyes. "You look like a good boy," he said. "If you'll give me your word not to escape, you can come out here and I'll try to explain."

OLAF readily agreed and the door was unlocked. He was conducted to a side wall where the old man held up his globe to light a complicated mechanism to which wires led from the room above. The youth, with no knowledge of machinery, gazed at the thing without comprehension. There was an instrument board beneath a large upright sheet of ground glass.

"Telepathic thought-wave receiver," explained the other with all the enthusiasm of a teacher coaching a backward pupil. He pressed a button and the plate was illumined.

"Map of the vicinity. Hundred-mile radius," he said. "The black dot in the center is where we are now. Most important to locate people, if any exist, so we built this mill to give us a little power from an old-fashioned generator on the floor

above. We used to have instruments with a thousand-mile radius when the big powerhouse in Avalon was working, but we can't get that kind of power now."

He paused as if to collect his thoughts and scratched his head dubiously as he looked at Olaf.

"The instrument employs two fields," he went on. "A beam and a band." Pressing another button, he caused a black line to appear on the map extending from the center dot to the far edge. "With this dial you swing the beam all around the compass until you pick up the emanations. Accurate tuning was necessary when there were many people, for there might have been a thousand scattered along that straight line. You eliminate interference on the beam with the band, and vice versa."

He pressed another button and a black circle appeared with the dot as a center. As he manipulated another dial, the circle expanded and contracted.

"Where the beam crosses the band," he continued, "the emanations are accurately focused. That also gives us the point on the map from which the impulses come. We leave the machine turned on with the band extended to its utmost. If anyone crosses the band, as you did, there is a brief signal, for the actual field is only a few yards wide. Then we adjust the beam."

"We've been following your wanderings that way for a week, and have listened to every thought you've had. You kept on coming toward us, or we would have gone out to find you. The impulses come over the loud-speaker up there on the wall, and there is another speaker connected in the laboratory, for we couldn't spare a man to operate the machine continuously. There are a set of headphones here, also. Now do you understand?"

At Olaf's blank look, Johnny frowned

and snapped off the switches with a shrug. "Haven't you ever been to school?" he asked.

The youth shook his head, abashed at his ignorance. "There weren't any schools in the arctic," he responded. "I learned to read and we had a few books. My grandfather went to school somewhere."

"*Tsk, tsk, tsk.* I forgot," mused Johnny. "There weren't any school-teachers left. No schools anywhere, of course."

Returning to the other room, he pulled out the table and motioned Olaf to sit down. "I'll not lock you in again," he said kindly. "It's much nicer this way. But something must be done about this situation. You've grown up as ignorant as an animal. We're all old men here, ready to die. Knowledge will be lost with us."

"I'd like to learn about these things," replied Olaf seriously. He disposed his tall frame in a rude chair gingerly. His young face was sober. "But how?"

"Aye, how?" responded the old man moodily. "A great library with a million and a half volumes in Avalon, and we daren't go there. The place is a death trap. And we're all scientists here, so heavily specialized that our knowledge is worthless to the group."

He sighed heavily. "I was a chemist specializing in the reduction of wood pulp and the fabrication of artificial wood supplies. But what good is my knowledge now with the country all one big forest? America has reverted to the Miocene, what with camels and elephants running around. All sorts of things escaped from zoos in the last days of the race. Most of them acclimatized and multiplied. It's a wilderness paradise, if you like that sort of thing."

THEY WERE interrupted by the appearance of one of the others, a

broad-faced old man with sloping shoulders. He came in silently on bare feet, frowned at the open door between the rooms, and directed a quick glance at Johnny. The latter, apparently in no fear of contagion, took no notice. The man left a tray and went out with a warning glance back over his shoulder.

"That's Trevor," remarked Johnny. "Sober ass. I haven't liked him in years."

As they ate, Olaf identified a piece of buffalo meat. There were some good vegetables and a brown paste that puzzled him.

"Synthetic," explained Johnny. "Contains all the vital elements. We had to depend on that kind of stuff during the war. Can't make much of it now and it's no longer important."

Olaf studied the old man reflectively, wondering if the other were in his right mind. Little could be seen save his large, deep-set eyes and long, strong nose. Johnny had a habit of trying to brush back his long, gray hair, but an unruly lock always came creeping down again over his high forehead.

"You talk as though you had been through the war yourself," said Olaf.

"I was."

"But that was more than a hundred years ago!" exclaimed the youth.

Johnny nodded. "I'm a hundred and fifty," he said, surprisingly. "Some of the others are much older." Then, at the youth's baffled look, he added, "Protolamin. But I suppose you don't know about that, either. Secret of the protozoon immortality. Extracted from the amoeba. Only eminent men had it because it was very scarce.

"Individual amoebæ may die by accident or disease, but each living individual is a bit of immortal protoplasm that has been growing and dividing since life began. We might have lived a long time yet, but we

can't make protolamin, now. The treatment has to be renewed every twenty years or the effect wears off. We'll die soon, like everybody else."

Olaf noticed that the old man's eyes were growing heavy. Soon Johnny was nodding. He watched with amused interest, not yet knowing what to think of these humans. Presently Johnny was fast asleep with the neuroblast across his knees. Arising quietly, Olaf picked up the weapon and examined it gingerly. But he could make nothing of its complicated mechanism. He laid it carefully on the table.

A sound drew his attention to the window, and he started as he gazed into the glowing orbs of a leopard just beyond the bars. Chasing the beast away, he glanced around again. He was able to see the value of the bars, now. The place was not a prison. The bars were to keep wild animals out and not to keep humans in, for the windows had no glass. A lusty snore from his companion settled his last doubts. Johnny was sleeping so confidently that suspicion vanished.

Olaf told himself that it would probably be easy enough to escape, but he no longer wanted to. He felt an overwhelming urge to remain and learn more about things. His abysmal ignorance troubled him. Stretching out on the cot, hands behind his head, he stared at the ceiling, thinking of the things he had heard.

But a huge drowsiness was stealing over him and he was soon fast asleep.

### III.

HE AWOKE with daylight dulling the glowing globes. Unaccountably weak, he staggered as he arose. Johnny was swearing in the other room.

"I don't like it," the old man stormed. "They've been in here. The neuroblast is gone. The outer door

is locked so I can't get out. Maybe they think I should be quarantined, too, for getting so close to you. Maybe they distrust me for not keeping a good watch."

"I feel dizzy," remarked Olaf.

The old man peered at him fixedly. "We were drugged," he decided vehemently. "I haven't slept well in years. Never slept sitting up in a chair in my life. I woke up on the floor. There is something going on here."

Olaf was conscious of a twinge of pain. Looking down, he found a red puncture in the hollow of his left elbow.

"I don't remember getting that," he mused.

Johnny looked at the puncture and examined his own arms critically. "They've drawn blood from you," he decided. "It's Terkov . . . he's the tall one. He was a chemist, too, specializing in colloidal compounds. Nearest thing to a biochemist we have left."

As the youth looked his incomprehension, the old man continued: "He's had an idea for years that we could continue human life synthetically. We're all men here and not a woman left. It was a line of experiment that had progressed far at one time but had to be given up during the war when all our efforts were turned to destruction instead of creation."

"Oh, so that's it," frowned Olaf. "I dimly remember him saying something about youth, health and strength. So he wants to experiment on me? Like hell he will!"

Johnny's bright eyes surveyed him shrewdly. "That's it!" he exclaimed. "They expected you'd put up a fight about it so they drugged the food. I ate some, too. I guess that lets me out."

"I thought Trevor looked at you in a funny way."

"I missed it," admitted Johnny. "Guess my eyes aren't as sharp as yours."

"What is Terkov doing?"

"He's got something that will take the place of the ovum," answered the other, "but no one was ever able to create the vital male element. As soon as we located you, he took a chance and went into Avalon for books and materials. He's been in quarantine, too, so I don't know what he has been doing lately."

"A few weeks ago he showed us something that looked like a jellyfish. It was protoplasmic and alive, but if it could reproduce it would reproduce its own kind, and that is not the object. They did that long ago. He's formed the egg substance, and now he's got to create the sperm cells."

"Human cells are no good. They're already created. His protoplasm might produce something that way, but it would be a monster, and that's not the object either. There are enough beasts around, now. He's got to create the vital male element and thoroughly understand it in order to control it and produce something human."

Johnny combed his beard, eyes serious, and sadly shook his head. "Men spent their lives on that and got nowhere," he added soberly. "It might have been done at one time. But not now. Not now."

As the sun rose behind Elysium, Olaf wandered to the window and scanned the grove with a frown. Terkov's egg had an ominous sound.

"What does Terkov want with blood?" he queried.

JOHNNY, with the prospect of a week's imprisonment ahead, had gone to the receiver and was pushing the buttons. "Don't know exactly. It's not my line," he responded absently, dialing idly all round the compass. "I fancy he thinks if he can get the various types of human cells to reproducing, he may solve the problem of the sperm. He's bled himself

nearly dry over it. Probably been up all night."

"So now he expects to drain me!" began Olaf angrily.

But just at that instant the loud-speaker made a gritting noise. Olaf looked at the old man questioningly.

"Something crossed the band!" cried Johnny in excitement and dialed furiously.

"Drat the little beast!" said a voice from the air above them and Olaf glanced up in astonishment. He surveyed the speaker in awe. But Johnny was glancing at the intersection on the map. It indicated a spot far to the east.

"Now I've got you," went on the speaker. "Oh, you poor little thing!"

"A woman!" exclaimed Johnny under his breath. Reaching out quickly with palsied hands, he pulled a switch which disconnected the speakers. He adjusted the headphones with trembling hands. "O Lord, I hope they didn't hear," he muttered.

As Olaf looked on bewildered, Johnny turned a quick glance over his shoulder. "Go to the window," he directed hurriedly. "There may be men working in the gardens. See if they've noticed."

Olaf leaped to the opening looking toward the villa and saw two men hoeing in the gardens. But they were doing it mechanically with no thought for anything else. He was drawn irresistibly back to the receiver.

"It's a woman all right," Johnny told him, listening intently. "She was chasing a fawn when she crossed the band. Going fast, that's why the first signal was so brief. She's caught it now and is talking to it. It's been hurt by some animal. The signals are clear because she's talking out loud."

Olaf hung over the old man's shoulder impatiently. As Johnny continued to listen, the youth stole back and forth to the window to keep watch over the men in sight.

"Here comes breakfast," he said.

In trembling agitation, Johnny snapped off the switches and removed the headphones. He literally dragged Olaf into the other room and pushed him down at the table. They were loafing like bored prisoners when Trevor arrived. Johnny eyed the latter sidelong, but apparently the other men had not been in the laboratory and had no notion of the event.

Olaf was still a little skeptical about the old man's state of mind and regarded the other dubiously when Trevor had gone. "What's it all about?" he wanted to know.

Johnny was too excited to eat and pushed away his plate. "This changes everything," he declared. He surveyed Olaf's calm demeanor and brushed back his errant lock impatiently. "Don't you see what it means?" he queried, annoyed. "The human race can go on! She seems young and healthy, like yourself. It's up to you two."

The youth regarded him quizzically.

"I won't have Terkov interfering," explained Johnny hurriedly. "While he's just fooling around with synthetics, I don't mind. Keeps him out of mischief, at least. But this is too important. I can't trust him with this woman for he'll probably want to experiment on her, too."

Johnny frowned a moment grimly. "I didn't intend to tell you," he added seriously, "but Terkov is a schizophrenic—split personality, you know. Nine tenths of the time, he's a brilliant man, but he takes fits of brooding—we all do—and he gets queer ideas. If something upsets him, he's liable to be violent. We've even had to shut him up in the past."

Olaf still failed to grasp the point.

"We're all too old," explained Johnny impatiently. "There were a few women scientists left when the plagues died down, but they were old, too. We were all old before we were deemed worthy of protolamin. It extended the life period of the normal healthy individual, but did not extend the

procreative period. Those of us who are left are just the lucky ones who not only escaped the plague but had protolamin. There were no children among us."

"Let me listen," insisted Olaf.

Johnny adjusted the earphones for him and then strode about the room in deep thought. He peered from the window from time to time.

"We'll have to be resigned to quarantine," he muttered. "No one else must get near the machine."

"The voice is fading," said Olaf.

"Draw in the band," suggested Johnny.

Olaf soon had the trick of following the girl with the dials. He listened to the unknown in fascination.

Johnny was worried. "If she keeps on coming this way, all right," he said, half to himself, "but, if she goes the other way, we've got to be free to follow her." He stared at the bars a moment and then relapsed in deep study.

Disliking Terkov, as he had from the first, Olaf saw the point. Johnny went to the window and lounged against the frame trying to look bored. From time to time, Olaf drew in the band.

"She's coming this way!" Johnny exulted.

AS THE conspirators listened, taking turns at the instrument, the band continued to grow smaller. By noon she had accomplished about ten miles. They already knew much about her from her active thoughts.

She had been born in the northern Adirondacks of old pioneer stock. Intensely independent, even secretive, her ancestors had had no use for society and had scorned the cities. Keeping sedulously to their rocky hills, they had been untouched by the war and had somehow escaped the plagues. She was the only one left. Like Olaf, she was just wandering from place to place with curiosity leading her on.

After lunch, there was a change in the situation that caused Johnny some worry. One of the men came with the neuroblast and began loafing nearby, apparently keeping an eye on the mill. Johnny shut off the receiver and they talked at random, in case they were overheard.

"Quarantine is just isolation, you know," he commented. "As long as we keep away from the others, we should be allowed to go fishing."

He winked at Olaf slyly and the latter cast a glance at Gissing, a crooked-nosed man whose eyes were set too close together, who was doing nothing, studiously, not far away. Olaf grinned, beginning to see that behind the old man's tortuous mental processes there was considerable shrewdness.

"Now I regard fishing as a most useful occupation," continued Johnny. "It keeps you out in the open, gives you beneficial exercise, helps the table, and, in addition to all that, it's *fun*. That's why the others don't like me. They're all so deadly serious that they regard fishing as mere childishness. They think I'm a little crazy."

He studied the youth critically.

"Gardening is the only other useful science we have left," he said. "We have all the usual things for this latitude and have even made improvements. None of us knew anything about it, at first. We just picked it up. That's what I intend to do with fishing. I'm not good at it, but you know all about that and can teach me."

Olaf felt better to find that there were some things he knew of which Johnny was ignorant.

"You will teach me?" pursued Johnny.

Olaf nodded.

"It's my opinion Terkov could be better employed, too," the old man continued. "Finding a way to make clothes, for instance. Of course, we

could make none of the spun glass and cellulose garments we used to have, although the latter was along my line. We couldn't go back to old-fashioned textiles because there's no cotton around here and all the sheep are wild. Still, we should be able to do something. It's a great inconvenience in the winter."

"Do you think she's still coming?" whispered Olaf.

"*Sh-h,*" responded Johnny. "Gissing is coming closer. I don't like this at all."

#### IV.

"TELL me more about things," requested Olaf, his gray eyes eager.

"Gosh," the old man returned, "with anyone as ignorant as you are, I wouldn't know where to begin."

They took chairs to the window and tilted back at ease where they could keep Gissing in view until they decided what this new factor might mean. It was apparent now that he was some sort of a guard.

Johnny reflected a moment, still dubious of Olaf. His self-appointed task as educator was assuming mountainous proportions.

"Guess it all started back in the third and fourth decades of the twentieth century," he continued. "Science used to be a poor man's hobby. Rich men weren't interested and poor men weren't financed. Science didn't amount to much.

"But with the breakdown of the old investment system, wealthy men had no place for their surplus funds. Taxes grew heavy. So a small group of financiers conceived the idea of putting their wealth in subsidies to science, taking control of basic patent rights in return. Patent rights became the wealth of the world and science went ahead by leaps and bounds.

"In 1965, Bowen succeeded in smashing the atom and, in quick succession, Aldrich accomplished the low-wave broadcast of power, and

Kane's receiver, the rotodyn, quickly rendered obsolete the Diesel, the steam engine, and all other forms of power that had been used up to that time.

"So a small group of promoters found themselves in control of the world's machinery. They built great power-houses for the broadcast of cheap power used by the rotodyns. Manufacturers could no longer compete, using the old expensive forms of power, so they had to have our machines. Every rotodyn turning throughout the world paid royalties to the promoters who were soon enormously rich.

"Then, in 1970, Hood isolated protolamin. It was only available in microscopic quantities and so was monopolized by Hood's sponsors, the same group of money barons. It conferred extreme longevity and they were able to go on corraling the world's wealth until most of it was in their hands.

"They created the Avalaine here in what used to be the old States of Nebraska, Kansas, Iowa and Missouri. There were already rumblings of war in the world so Avalon was built as far as possible from either seaboard. The Avalaine, with its cheap power, became a great manufacturing center. The money kings brought most of the world's greatest scientists here and so we had the advantage of a monopoly of brains and intellect.

"The control of power was soon slipping, as some countries revolted and seized our power plants, and patent rights ran out from time to time, but still our inventive ability kept us one jump ahead of competition. We had high-speed automatic machines for every purpose and so could produce goods cheaper than anyone else. In order to compete with us, manufacturers had to have our machines, and so the world continued to pour its wealth into Avalon."



*"Now stay here," the oldster snapped.  
"You can't fight a neuroblast, and you  
may as well realize it"*

Johnny leaned back at ease with vacant eyes lost in the past.

"There was never anything like it," he reminisced. "We soon had a population of ten million. It was the greatest city in the world. Every-

one wanted to live in Avalon, but citizenship was restricted. We had no illiterates, no imbeciles, no loafers, and there were few physically below par. Crime hardly existed. That was why we not only had the genius to

manufacture the jade, quartz, onyx, marble and so on you saw in the city . . . much more beautiful than the scarce natural product . . . but also the greatest artistic talent in the world to work with it.

"Everything else was the same. Avalon became the world's cultural center. The greatest architects, artists, writers, poets, musicians, thinkers were all ours. The barons stripped the world of its art treasures for our benefit—"

Johnny paused. Olaf was trying to get the picture the old man had drawn. He glanced over and saw the old man's chin sunk on his chest. Johnny's eyes were closed. The contrast between the emaciated, ill-kempt graybeard in his ragged wolfskin, sitting bare-legged on a homemade chair, and the scenes he had called to view was so great that Olaf was uncertain.

"Tell you about it, sometime," muttered Johnny in his beard. And Olaf saw that the old man was so disturbed that he forbore to question further.

GISSING left at supper time and they tuned in on the unknown. They participated in the chase of a wild pig and her preparations for supper. At dusk, they listened with hearts beating fast while she was pursued by a pack of wolves. She climbed a tree and remained awake late. As the evening wore on, the pair forgot their caution.

Terkov, having been up all night, had slept during the day. He was still about. Both conspirators started at a sound on the path outside and turned guiltily to see the lean, dark old man looking in a window. Terkov came in abruptly.

"What are you two up to?" he demanded angrily, his bloodshot eyes flashing. He noted the loud-speakers were cut off and threw the switches scowlingly. His black eyes snapped from one to the other as he listened.

No sound came from the instrument.

"I was just explaining how it works," remarked Johnny, striving to be casual.

He was trembling in fear lest the voice sound again and give everything away.

Terkov was still suspicious. "Hereafter, you will do your listening with less privacy," he snapped. "I don't want to find that turned off again."

He stepped outside the door, looked toward the villa a moment, and then shouted impatiently.

Cold sweat had broken out on Johnny's brow. "Whew. That was a close call," he whispered.

Olaf was puzzled. "Is the thing out of order?" he asked.

"No. She's gone to sleep," replied Johnny.

Terkov, Gissing and another came in. The tall leader had the neuroblast which Gissing had fetched along. "We're ready for you, now," said Terkov, nodding at the youth.

"Look here—" began Johnny angrily.

Olaf leaped to his feet. His eyes narrowed dangerously as he surveyed the trio advancing upon him.

"What are you going to do?" he demanded.

His aspect was so threatening that Terkov paused in his tracks. He knew he was no match for the muscular youth. Raising the neuroblast callously, he took aim. As Olaf made a bound forward, there came the same hissing pop he had heard once before. He crashed to the floor unconscious.

Johnny was stuttering in rage at this high-handed treatment.

"Get back," warned Terkov, turning the weapon upon him. And as Johnny paused in impotent rage and indecision, the leader calmly nodded to the other two. They heaved Olaf from the floor with some effort and carried him out.

The latter came to himself in the same slow fashion as before to find himself back on the cot again. As he struggled to sit up, he found that his arms were tied behind him. His feet were free, however, and he arose dazedly.

Johnny was outside the other door again, looking in through the bars. Olaf swore furiously and the old man peered at his rage in indecision.

"Better be quiet," Johnny advised. "It's no use to struggle."

"What have they done to me?" raged Olaf.

"They took you to the laboratory," shrugged Johnny. "I'm in quarantine, too, so I don't know what they did. They've still got the outer door locked so neither of us can get out."

"That Terkov!" fumed Olaf. "I'll —" But he subsided in spluttering futility.

"They figured you would feel like that about it," the old man told him. "But, if I were you, I'd be good. We can't antagonize them now and stay penned up here at this critical time. We've got to have our freedom so that we can go look for the girl."

"Why?" demanded Olaf in alarm.

"Because Terkov was suspicious," responded Johnny. "They've taken the receiver away and strung a power line to the other building. Now they'll know about her as soon as she wakes in the morning."

"If they think I'm going to stand for this, they're all crazy," declared Olaf. "Maybe my grandfather was right. He always said the human race had gone stark, raving mad. I want to get out of here."

"YOU DON'T want to live all alone in the world, do you?" asked Johnny. "It's not pleasant. And if you do escape, I won't have anyone to talk to. I'm tired of these other fellows. We can't think of anything more to talk about. We just quarrel. I hope you'll reconsider."

Olaf was not certain whether he liked people or not. Up to the present, the impression was distinctly unfavorable. "You're all right," he said sullenly. "It's Terkov. I hate him already."

"That's the way it always was and always will be, I suppose," mused Johnny. "As long as there are people, they will disagree about things. But I've seen enough of fighting. Why

don't you be good and not spoil our chances?"

At Olaf's quick look, he added: "They've told me I can untie you if you are reasonable. They've also told me that if I don't make a good job of guarding you, they'll put Gissing here. You wouldn't like him at all. He'd keep you tied up all the time."

"I see," responded Olaf. "I'm willing to be good if they'll let me alone."

Johnny opened the door and began to unfasten the bonds. "Mind you stick to it," he warned. "We've got to regain their confidence somehow, so that we can get out."

"Can't you disconnect the generator so they can't hear?"

Johnny shook his head. "Daren't do it with things in this shape," he responded. "It's out of our hands for the time being. They'll hear the girl and go get her. We'll have to let them do that and think of something else."

Olaf stabbed a questioning look at him.

"She was coming straight for Avalon," explained the old man. "If we could only think of something in time, we could head her off. But we'll have to leave it up to them, I guess. If she keeps on that course, she'll see the city, and curiosity will lead her into it. She'll be doomed."

"Can't we do *something*?" demanded Olaf.

"Not while we're prisoners," returned the old man. "Most important thing right now is to let them steer her around the city."

Olaf paced around the room, sat down, got up, and finally paused in the center of the floor angrily.

"What have they done with my weapons?" he queried.

"I fancy they are using them to hunt," replied Johnny. "They were much better than our own bows and arrows."

Olaf was surprised. "You can make things like the neuroblast and the receiver and can't make bows and arrows?"

"We didn't make those things," responded the other. "At least not here, under these conditions. There were vast quantities of some things, mostly war materials and supplies, left in Avalon. A lot of it is still there, although much of it is no good now,

"We brought a few things with us. But the neuroblast is a short-range weapon—we don't use it for hunting. Anyway, there are only one or two charges left in it. Takes a long time to charge it on our small generator."

Olaf's eyes narrowed as he stored that piece of information for future reference.

"We're practically out of everything," sighed Johnny. "Even simple tools have worn out."

"I don't see how they can find her," said Olaf.

Johnny stretched out on the cot, placed his arms behind his head, and crossed his ankles.

"That will be easy," he returned. "We still have several radio helmets left and our power is sufficient to operate them. Someone will remain to operate the receiver and keep the girl marked down on the map. The others will be directed to her by two-way radio."

Olaf scratched his head in exasperation. "I thought they'd need me to track her down," he said disgustedly. "Every time I get an idea, you have some infernal machine to make it useless."

"Machines are better than humans for some things," reflected Johnny. "Too good, sometimes. Machines are like a race of insensate people, both clever and stupid. They were our slaves, once. We fed them with power and made them work. But the slaves rebelled. They wiped us out."

"How was that?" asked Olaf in surprise.

## V.

"OURS WAS a mechanical civilization," the old man went on. "It back-

fired on us. We invented so many high-speed automatic machines for our cheap power that manufacturers, elsewhere, had to have our power and our machines in order to compete with us. The result was that three quarters of the human race became unemployed and lived in abject misery. Machines led to unemployment, which led to wars, which led to plagues. We had started something we couldn't stop."

Olaf wrinkled his brow as he regarded the old man with patience.

"We were able to keep out of the wars for a long time," Johnny continued.

"But, as they spread, we turned more and more to the manufacture of munitions and supplies. The barons were greedy for more money. When the wars had spread all over the world, other countries were in difficulties and had to come to us for what they needed. We provided their weapons, explosives, gases, and so on, and invented new things for them. As they got in greater difficulties, we even provided synthetic food supplies. They came to depend on us and the barons soon had what little wealth there was left in the world.

"Other countries were soon hopelessly in debt to us and there was no way to pay off. It was cheaper to declare war and repudiate. There was a little European war back in 1914 that had started the growth of the great empires. The Asiatic war with its humble beginnings in 1932 had created others. They were our best customers until they were broke. Then two or three of the empires got the same idea. If they could capture Avalon and control its scientists and vast munitions works, they could win out and rule the world. So we found ourselves attacked from all sides.

"They had rebelled and seized our powerhouses for power. Then they copied our machines and weapons. When we found our own inventions turned against us, we had to invent still more deadly things in self-defense. Then they copied those, too, and so the process went on, with Avalon

always one jump in the lead, but with the war growing more vicious every day. Then, when the six empires combined against us, we had to fight for our lives.

"Science changed the nature of war rapidly. In desperation, we concentrated on the senses of the private soldiers. Our resonators shattered their eardrums and disorganized their nervous systems. Our flash batteries blinded them. Our infra-red guns and gases burned the skin off of them and left them exposed to tetanus, gangrene and blood poison. Millions who had invaded this country were left helpless. They were interned and later swept off by the plagues. So the common soldier ceased to be a factor."

JOHNNY looked over at Olaf, who had shuddered in horror. "I'm glad I was not alive in those days," the youth muttered.

"It was forced on us," explained Johnny, "and there was no place to stop. Every time we invented some new kind of a metal slave, we found it multiplying surprisingly among the enemy. All those metal men came marching back at us.

"We rendered some things futile, of course. The airplane had gone out of use because no device containing electrical equipment could get through the neutrality curtains we hung about our cities without wrecking every electrical appliance on board. Any ship containing men was useless. Our resonators blasted them apart, and our infra-red barrage burned them out of the skies. So we used rockets loaded with explosives.

"They hadn't been able to copy our infra-red barrage when we developed detonite. That gave us an advantage, because our rockets could get through where theirs couldn't. We turned to long-range offensive measures against the vital nerve centers of the world

—the crowded industrial and manufacturing points and transportation centers.

"A hundred pounds of detonite would destroy a fair-sized city. We got them one by one. Our rockets could get through the neutrality zones with a rocket charge after being driven close to their objective by the rotodyns using the enemy's own power. We tuned the rotodyn equipment to the wave length of a powerhouse and let it go. It rode the waves to the source of its own power. It was like shooting a steel bullet at a high-powered magnet. We couldn't miss. The powerhouses were always located at the most strategic points. Detonite wiped them out and the cities with them.

"We gradually won out, because everywhere else wealth had vanished. The bulk of the population was reverting to the primitive. War and loot was the only way to live. Education had to be abandoned so that fewer and fewer scientists could be trained to fight us. As commerce was disorganized, starvation spread. Even such simple necessities as common sanitation had to be abandoned, so that pestilence reared its head to add to the general misery. When we at length had the commercial cities destroyed, the war began to die down. They could no longer get supplies and so had nothing left to fight with.

"But everything boomeranged on us. We had been forced to create such engines of destruction that a great part of the race was blind, deaf, or otherwise incapacitated. As the plagues took hold, they died by the millions. When we destroyed Tokyo with a thousand pounds of detonite, the shock caused an earthquake on the Pacific coast which wiped out our own Seattle. When we destroyed world commerce, we destroyed the source and transportation of medical supplies. Even the simplest medical necessities became unattainable. There was no way to

combat the plagues and they swept off those whom the wars had left. We had epidemics in Avalon, too, but through it all our medical science was able to cope with those things and they never became serious."

Olaf did not notice that Johnny had paused. He was fascinated by a vision of hurtling fleets of planes, loaded with death, crashing in the neutrality zones, and carrying helpless men to instant death. Of deadly rocket planes, with no hand at the helm, blasting asunder in midair. Of detonite making matchwood of vast cities in the twinkling of an eye. Of helpless humans, blinded, deafened, burned, dying in droves from the plagues they could no longer control.

"You can see what happened," continued Johnny. "Never a shot or shell fell in Avalon. The city is as good today as when it was built. But a commercial city was no good without commerce. And you can't make money out of a war you have to fight yourself. It was all expense and no profit. Even the barons were soon penniless. They put the last of their fortunes into those fantastic tombs and mausoleums you saw in Elysium. Then there was nothing left. The rebellion of the slaves we had created was at an end, but so were we."

THE OUTER door opened abruptly and Terkov strode in. Olaf leaped to his feet belligerently with narrowed eyes and clenched fists. But the tall one had come without the weapon and merely motioned impatiently for Olaf to remain seated.

"Something very important," began Terkov, his deep, rasping voice serious.

Olaf refused to sit. Johnny swung about on the cot, lowering his feet to the floor. The pair stole an uneasy glance at each other, wondering if Terkov already knew about the girl. But the latter was lost in frowning

thought as though he hesitated to begin. A bony hand clawed his beard. When he spoke, it was to Johnny.

"As you know," Terkov began abruptly, "I've been experimenting with cells, the ultimate object being the male element. I've tried everything but the brain cells. The youth here possesses a healthy body, but the mind of a child. The others have agreed to draw lots for a simple trepanning operation. We need the trained scientific type of brain cell."

Johnny was amazed. "You can't grow brain cells in culture," he objected.

"I *am* doing it," responded Terkov impatiently, "but all nonhuman cells. I think you will agree that when we have all the human types reproducing freely, we will be well on the road to the accomplishment of our objective."

"But you're not a surgeon," retorted Johnny.

"Enough for the purpose," responded Terkov confidently. "It will be a very simple matter with no danger at all. Very little of the brain is actually used. Large areas, with no known function, have been removed without effect. I shall need but a few cells."

Olaf was regarding him skeptically. "You'll get none of mine," he said with conviction.

Terkov frowned slightly and surveyed him briefly with cold eyes. "We are not interested in breeding a race of idiots," he returned.

The youth flushed and took one angry step forward. Then, remembering the age confronting him, he paused almost wishing the other had brought the weapon. The leader had the unpleasant faculty of goading people to a desire for mayhem.

"You're crazy," muttered Olaf impotently.

The effect was electrical.

Terkov sprang to his feet with a piercing cry. His black eyes dilated

and his thin mouth worked. With flailing hands, he rushed upon the youth.

"Crazy!" he shouted hysterically.

Olaf caught him easily and pinioned his arms. Terkov strained and spluttered in impotent rage. Beneath his dark skin the blood drained from his face until it was an ashy gray. He was almost frothing at the mouth.

Johnny had risen to his feet in horror. "Olaf!" he shouted. "Don't hurt him."

"I'm not going to hurt him," responded the youth angrily, wincing as Terkov kicked, bit and scratched.

"Let him be."

Olaf pushed the man away impatiently. Terkov glared at him once, his face a mask of hatred. Then he ran from the room, and they heard him shouting insanely as he rushed up the path to the villa.

"Should have warned you about that," remarked Johnny soberly. "We have to humor him. If you were to call me crazy, I wouldn't mind. But Terkov goes wild. It brings on one of his spells."

"HE LEFT the door open," said Olaf quickly. "Let's get out of here. No telling what he'll want to do, now. Come on, before they bring one of those damned things that knock me out."

"I'm too old," replied the other, his eyes troubled. "I could never stand the life. You go ahead."

But Olaf hesitated. His glance lingered fondly on his aged companion. "I wish you'd come," he said earnestly. "I think this quarantine is a fake. They're keeping you penned up for something, too."

Johnny was tempted. "I'm beginning to think you're right," he muttered. "We could never trust him to perform an operation in his present state. And yet, if I know Terkov, he will insist upon it."

"Can't you see?" expostulated the youth. "He only wants my body. He wants your brain. He'll demand more and more. And there's the girl. This is our chance to go after her."

Johnny sprang to his feet.

But before the pair reached the door there were sounds of bare, running feet on the path. They were confronted by Terkov and six others. Gissing with the neuroblast was prominently to the fore.

"Back!" the latter warned savagely, his narrow eyes snapping, as he swung the weapon from one to the other.

Olaf backed in helpless rage. Gissing had every appearance of a desire to use the thing on the slightest excuse. Olaf felt no fear of the weapon itself, since it was harmless, but was in horror of what might happen during a period of unconsciousness. Rage impelled him to violence. Caution urged him to conserve his senses in this situation. He was sure he could handle the lot, old as they were, but of what use was mere physical strength against such a force as Gissing itched to use?

He kept his scowling gaze on Gissing's hands while he sullenly submitted to having his hands tied behind him. There was still a chance while he remained in possession of his faculties. He stood glowering in indecision from one to the other. Johnny was being tied up in the same way.

"To the laboratory," commanded Terkov.

Olaf swore and heaved clear of the two who had him by the arms. He glanced at Johnny who was studying Terkov with troubled eyes. The latter seemed to have mastered his mania enough to hide it from the others. But, as Gissing tightened his finger on the trigger, Olaf subsided.

"I told you this quarantine was a fake," he growled at Johnny.

"Maybe you're right," mumbled the old man.

Terkov had started for the laboratory, but paused to glance back.

"Since you've taken this antagonistic attitude," he said vindictively, "we'll dispense with the trouble of drawing lots."

## VI.

AS THEY entered the rear door of the villa, Johnny was glancing absently at the sky. Olaf was trying to think of some plan of escape without success. The place and the people began to look less attractive every moment.

They were joined by other old men, for all had been aroused by the shouting. The youth saw that they were much alike—all aged, all thin, all clad in ragged skins. One snowy-haired old man appeared to be beyond the stage of usefulness, hobbling along with difficulty as he leaned on a staff. Evidently Johnny was the only one who did not believe in Terkov's ability, for the others all treated their leader with confidence and respect. He seemed to have recovered his composure.

On the way, Olaf formed some notion of the beauty of the place when it was new. All the rooms were on the ground floor surrounding an atrium, Roman style, except that the latter was roofed with glass. A fountain in the court was choked with weeds and rubbish and much of the glass had fallen in. The onyx and marble of pillars and walls were still as good as ever, but paintings on the walls and plaster on the ceiling had scaled away, leaving barren leprous patches as though the villa, too, had contracted some disease.

The laboratory, on the side toward the river, had been a spacious solarium. It was all tall windows in the French style, save for its small columns of translucent rose quartz. A large globe in the center of the ceiling shed

a brilliant blue-white light. Olaf noted the thought-wave receiver installed in a far corner below a speaker. There was no heavy electrical apparatus, because of the lack of power, and the scientists no doubt felt handicapped, but to Olaf the array of equipment and apparatus was bewildering.

Terkov, with some conceit in his ability, made a contemptuous effort to convince Johnny. He led them about the room displaying test tubes and jars which evidently conveyed something to Johnny but left the youth baffled. They at length paused before a large glass case on a low table. It was much like a large aquarium, wide and square, but not very deep. In a few inches of water reposed a large lump of some jellylike substance.

"Almost a perfect reproductive system," explained Terkov in the pedantic manner of a guide on lecture tour, "but as yet no brain and but a simple circulatory system. The alimentary system is almost nonexistent because it simply absorbs nutrition from our synthetic food material dissolved in the water."

"How could a human being be born from that thing?" demanded Olaf truculently as he stepped close to the case and peered in.

The organism quivered and moved. It seemed to be strangely agitated.

"The little red spot near the center is the heart," explained the leader, disregarding the youth's remark and pointing a long finger at a vague spot in the almost transparent mass. "You may observe the rudiments of a capillary system extending from it."

The aged scientist paused, finger extended, and scrutinized the increasing movements and convulsions in surprise. Olaf retreated a few steps, glancing about to survey the windows and their catches, still with some hope of escape. As he did so, the movements ceased.

"Come here," said Terkov roughly

and drew the youth back. The pulsations began again. The organism was violently agitated and seemed to strain toward the youth. Terkov seized his chin in a vigorous grasp and the others all studied the phenomenon with interest.

"This is something new," muttered one.

Terkov was puzzled also as he tugged at his beard a moment, then his black eyes glowed with a fierce light of triumph.

"It feels?" he cried. At their querying looks, he went on: "Being largely a reproductive system, this protean female is the concentrated essence of sex, we might say. It feels the presence of the male element. That means we have the beginnings of a nervous system!"

Olaf turned away, revolted and disgusted. But Terkov seized Johnny's ragged wolfskin in a fierce grasp.

"Don't you see?" he cried vehemently. "The developing circulatory system must be composed of human cells. The developing brain must be a human brain."

Johnny hitched his bound arms as though he would like to push back the lock of hair straggling down over his eyes. He looked decidedly skeptical and said nothing.

TERKOV turned away in impatience. "Make ready," he snapped. "Gissing will stand by to see that there is no resistance. Anders and Trevor will prepare the subjects. Hoffman and Carter will assist me."

Olaf was prey to a mounting confusion. If this was knowledge, he saw nothing attractive in it. The plasm in the glass case was repellent. Their concentration was something ghoulish. Their present intention, to his simple mind, hinted more at madness.

In growing rage, he watched Gissing narrowly. But that suspicious individual, in turn, watched him like a hawk, with finger on trigger ready to send him into oblivion at the first false

move. Olaf strained at his bonds futilely and glanced at Johnny. He could create a rumpus, he knew, but it would be of no earthly use once the charge of the neuroblast hit him.

Johnny did not appear to be apprehensive. Olaf was surprised when the old man closed one eye in a solemn wink.

"You guarantee this to be harmless?" the latter queried at Terkov.

The leader and two assistants were scrubbing their hands at a sink. He merely nodded, continuing his washing with an abstracted frown.

"Might as well trust to luck," observed Johnny resignedly.

"And Terkov," added that individual over his shoulder.

But Olaf felt no sense of resignation at such proceedings. With a sense of utter impotence, he felt himself being pushed upon a table one of the men had been scrubbing. He was forced down and stretched out flat. Johnny was being served likewise on another close by.

"I thought you didn't want my brain cells," Olaf growled disgustedly.

"We don't," replied Terkov, shortly. "But you have good healthy nerve tissue. We'll take some of that."

"A few microscopic cells," added Johnny reassuringly. "You probably won't even feel it."

Olaf was surprised at the latter's confidence. As they were strapped down to the table, his eyes wandered about the place rebelliously. Dawn was making the sky a shade lighter. He eyed the array of test tubes and retorts nearby in alarm. He felt himself being dismembered and scattered about here and there, a bit in each glass. Such things suddenly became menacing.

With a sense of nausea and revulsion at the whole thing, he heaved against the straps holding him down. As Johnny had said, the survivors of Avalon were so heavily specialized that their knowledge was useless. The mad Terkov, invading a new field in perfect confidence, was ludicrous. Olaf felt the

whole thing was useless and a burlesque on science. The villa was a madhouse.

Of a sudden, he knew he wanted to get out of here, to leave Avalon and never return. He was satisfied with ignorance if knowledge had come to this. Better no human society at all, than the society of fiends. To his inflamed imagination, they assumed the shape of monsters. He was disappointed with Johnny who was about to have a piece of his skull lifted without complaint.

"Let me up!" he roared, struggling frantically. "I won't stand for it."

But, if the bonds about his arms had rendered him helpless, he was now doubly impotent.

One of the men had gone to a cabinet where reposed some old though shining surgical instruments and some others obviously crude and home-made. Selecting an array of instruments, he placed them in a tray of boiling water. After a few moments of silence during which the barefooted men bustled about the last preparations, Terkov turned and nodded indifferently at Gissing.

"Administer the anæsthetic," he said coolly.

As Gissing raised the neuroblast, Olaf felt horror. He wished that he had taken a desperate chance and put up a battle. With quick, burning hatred, he thought that he might have been successful in settling a few of them in such a way as to make them lose interest in this solemn travesty. He stared at the implacable Gissing with hatred.

The latter approached a step as Olaf struggled furiously and calmly aimed the weapon at his head. Gissing's face was wooden and emotionless. To Olaf, he seemed as much a personification of relentless doom as the hunter who draws his knife across the throat of a stricken deer to put it out of its misery.

Olaf gazed in paralyzed fascination at the small hole in the muzzle as it swung in line with his forehead.

For a palpitating moment he waited, breathlessly.

"Ho-hum. It's daylight," said a voice from the far corner. "I can get down from this tree, now."

Gissing paused and the weapon veered off until it pointed somewhere toward the ceiling. They all turned and stared at the loud-speaker. Trevor, the nearest, rushed excitedly to the instrument board and the others followed. The pair were forgotten. Even Gissing hastened to join the group.

"No sign of the wolves," said the speaker. "Another nice day. I'm stiff all over. Ouch! It was easier getting up here than getting down. There, now."

Wildly excited, the old men crowded together, staring at each other in amazement. A babble of excited comment broke out. Olaf was conscious that Johnny was looking at him from the other table. He found the old man grinning slightly.

"I expected that," whispered Johnny. "She just woke up."

THE OTHERS about Terkov soon realized the situation. As Johnny had predicted, when their first amazement had worn off they began laying plans to intercept the girl before she entered Avalon.

But the aged leader was frowning as he left the group. "So this is what you two were trying to keep from us," he said sourly. His dark face with pointed, down-drooping nose, prominent cheekbones and narrow black eyes had a Tartar cast as he surveyed them like some barbarian despot disposing of their future.

"Look here," said Johnny, wriggling. "This experiment business is unnecessary. That's a woman, young and healthy. She can take care of the situation. Why not let nature take its course?"

"Certainly not," retorted Terkov, elevating his head scornfully. "We



*"You can't get away!" the old man wailed. "They'll catch your thoughts!"*

can't wait on the slow, natural process. We will all be dead soon. Civilization will die with us. A race of savages would result. And, even if she had children, there is no guarantee that a further outbreak of the plague will not take them. We must be able to create dozens, hundreds, thousands of people. This woman is just what I need."

"What if she doesn't agree to it?" queried Johnny.

"With the future of the race in her keeping," responded Terkov, "she will have nothing to say about it."

"You haven't got her yet," put in Olaf.

"We'll get her," responded Terkov confidently. Absently he began to undo the straps that fastened Johnny

to the table. "However," he added, "we will postpone this for the present."

Back in the mill again, with Gissing standing guard outside, the pair surveyed each other. Olaf had definitely made up his mind and examined the windows, the floor, and even the ceiling covertly.

"I hoped they would give us the neuroblast before she woke up," remarked Johnny in a low tone.

Olaf looked his puzzlement.

"Because then it would be empty," explained the old man, "and they wouldn't be able to charge it, for they will need all their power in the hunt for the girl."

"Hm-m-m, you're not so crazy," murmured Olaf quizzically.

Johnny's deep-set eyes twinkled. "There are times," he responded jovially, "when I fear I am quite all right. It will be nice to be with young people again," he went on in satisfaction. "I'm really too old to think of leaving here. We'll have to work the situation out somehow. The main thing is to find some way to control Terkov."

"And this Gissing," added Olaf in the same low tone. "If they weren't so darned old, I'd take a chance on cracking their heads together."

"You have the strength," agreed Johnny. "And also the inclination at present. You could lick the lot of us in a fight. But they know that. They'll not give you the chance. Terkov is really a brilliant man, and Gissing is no fool."

Olaf regarded his companion narrowly. "Terkov is making one mistake," he said seriously. "In regarding me as an idiot he forgets that I've hunted and have been hunted all my life. I've been in a hundred worse situations than this."

"You let him go right on thinking that," advised the old man shrewdly.

"I will," replied Olaf darkly. "But no mad man is going to keep me cooped up here while he cuts pieces out of me at leisure."

As the sun heralded another brilliant day, Olaf strolled to a window and studied Gissing unobtrusively. He eyed the man's scrawny neck with a calculating glance.

Just let him get close enough, he reflected. My hand will go around that puny neck. One good jerk of his head against these bars. He will drop the neuroblast, and I can take the key from him.

Whistling to himself, he stared at the grove and the bit of silver water just visible through the trees.

But the guard's alert gaze was on him constantly. Olaf's features were an open book. The suspicious Gissing read something he didn't like and was too wary to come close. He was never very far away, but sensed Olaf's hatred and kept clear.

## VII.

OLAF AND JOHNNY looked up from the table where they were playing cards. The old man had been teaching Olaf the game to while away the days of waiting. As the door opened and someone was unceremoniously pushed through the opening, they had a brief view of Anders with his face scratched and one eye blackened. They surveyed the girl with interest.

She was not above medium height and slim, with the trained athletic look that came from a strenuous life in the forest. Long, black hair made a cloak for her shoulders and below it she wore a soft brown otterskin. A small, round face turned toward them and deep-blue eyes, nearly black, smoldered upon them critically as they rose to their feet.

Glancing from one to the other critically, she fixed Olaf with a scathing glance.

"So you're the one," she remarked sarcastically. "Father of the Race, and all that."

Olaf was taken aback by the venom of her tones. He glanced uncertainly

at Johnny. He had always been curious about women, but had not expected them to be like that.

The old man politely offered the newcomer a chair and tried to make her feel at home. With a flirt of her shoulder, she went to a window and stood with her back toward them. She was evidently determined to hate them all. Ignoring Johnny's pleasantries, she remained staring at the grove, a slight frown on her brow, a bare foot tapping the stones of the floor.

"Do you play cards?" pursued Johnny.

But only cold silence rewarded him.

Presently three of the men appeared and much against his will, Johnny was taken out. He cast a look back over his shoulder at the frosty pair. Olaf remained at the table idly fingering the cards.

The girl turned a cold glance over her bare shoulder. "Now it starts," she said cuttingly. "Leaving us alone here! You touch me and I'll scratch your eyes out."

Olaf was nettled. "From what I've seen so far," he retorted, "I'd rather touch a rattlesnake."

"Keep right on thinking that," she warned.

He could have told her that it was no plan of his but remained silent in displeasure.

She swung about slowly and with hands on the sill behind her, looked him up and down critically. He flushed under the cool insolence of her glance.

"You look like a pretty husky specimen," she told him in her scornful manner. "What are you letting a lot of weak old men keep you tied up here for? Why don't you be a man and clear out?"

Olaf frowned. "I hadn't decided I wanted to clear out," he responded impatiently. "I'm ignorant as an animal. Terkov even called me an idiot. I've learned a lot from Johnny, and I can learn a lot more. I didn't want to go on being a savage."

"Hm-m-m! It suits me," she retorted. "No crazy old men are going to experiment on me. They'll have their hands full keeping me here. If I had a little more of your size, they wouldn't have gotten me in the first place."

Olaf didn't know what to say for a moment. "I can't fight a lot of old men," he replied sullenly. "It would be like killing babies."

"I'll not have any such objections," she said threateningly. "I can handle at least three or four of them. There's more than one black eye out there already."

He regarded her thoughtfully. Her sturdy, woods-trained build looked quite capable.

"Did you ever hear of a neuroblast?" he inquired bluntly.

"You mean that thing outside?"

"They stand off where you can't get at them and shoot you down," he told her. "It knocks you out cold."

Privately, he was wishing she would start something. If they gave her the neuroblast a couple of times, the weapon would be empty. It wouldn't hurt her and might take some of the spunk out of her. He decided that he didn't like her at all.

She turned to the window again.

"It might be all right if it wasn't for Terkov," he said. "And he may give up his experiments now."

She turned on him with blazing eyes.

Gissing had been listening with interest. He stole off up the path to report to Terkov.

"It doesn't work," he said doubtfully, entering the laboratory where the other was engaged. "They take to each other like a pair of strange bulldogs. They're having a fight."

"Oh, let them be," responded the leader without interest. "Keep an eye on them. Idleness, time and propinquity, you know. They're only human."

AT NOON Johnny came back. "I'm out of quarantine," he informed them, "but I'd much rather eat with you young folks."

Trevor brought a tray for three and they coaxed the girl to try her share. Olaf was doing full justice to his. Johnny had always regarded the youth's appetite with envy.

"Wish I could eat like that again," he said wistfully. "I haven't had an appetite in years. You don't know how sick we are of that man's cooking, after all these years. He had some talent for it at first, then he came to hate it. We took turns for a while, but that was worse."

The girl pushed her plate away, surveying Johnny with cool eyes.

The old man was still hungry for congenial companionship. "Miss . . . er . . . I don't know your name—" he began.

"Iola," she told him absently.

"Well, Miss Iola," he went on, "I want you to know that I have nothing to do with this scheme. Rest assured, if Terkov tries anything the least bit dangerous, I'll do everything in my power to help you escape. Too many things have backfired on us. I'm not in favor of any more. You two could get along somewhere else."

"We two!" she scoffed.

"Why . . . er . . . naturally," responded the old man a little puzzled and confused. Olaf tried to warn him with a glance. "You two are the only pair left in the world capable of . . . of—" he paused at the irate glance she turned upon him.

"I'm not having any," she said vehemently. "This Father of the Race, this Patriarch of Future Generations, will have to find someone else."

The old man regarded her helplessly.

Olaf pushed back his chair and

got to his feet frowningly. He went to the window and scowled at nothing. The three of them were strangely quiet when Trevor came back for the tray.

"Who cooked this putrid mess?" the girl demanded, motioning to the food left on her plate.

Trevor bridled. "I did," he said shortly.

"If I couldn't cook any better than that, I'd go make a hole in the river," she told him acridly.

Trevor surveyed her a moment with a thoughtful look and went out without comment.

Johnny felt constrained and soon left.

"I don't believe they locked that outer door," the girl remarked.

In sudden interest, Olaf left the room and tried the door. It was locked. At a sudden bang behind him, he turned and surveyed the closed door, between them. She was looking through the bars. She had taken the key to the inner side and twisted it spitefully in the lock.

"You stay out there," she told him.

THE AFTERNOON dragged away slowly. The girl stretched out on the cot and had nothing to say. Apparently she forgot his existence. He didn't care to disturb her. Lounging by the window, he tried to think of some way of overcoming the strange weapons with which she was menaced. It was like groping in the dark. Gissing still kept his distance.

Toward evening men came and got the girl. There had been a parley of some kind. Olaf heard them remark something about chancing the quarantine. He watched them go off up the path and then eyed Gissing sourly where the latter sat with his back against a tree, reading a book, the neuroblast across his knees.

"Evidently it pays to know how to cook," he remarked.

Gissing glanced at him and nodded. "Perhaps we'll have good food again," he said hopefully. "I haven't had a decent meal in sixty-five years."

Olaf wandered to the cot and took a nap. He missed the sudden flutter of excitement about the other building, the shouts and pattering of feet that drew Gissing away for a while.

But when Trevor came with the evening tray, Olaf surveyed his meal skeptically. He was disappointed.

"I don't see any improvement," he said to Trevor, noting vaguely that the latter had acquired a large bruise over the right eye.

"There isn't any," responded the other, in ill humor. "She only used it for an excuse. A few minutes ago she knocked me out with a potato masher and jumped out of the window. The others are off after her."

Olaf sprang to his feet so suddenly that Trevor had no chance to escape. The door was always left unlocked while the tray was brought in. Seizing the old man despite his struggles, Olaf pinioned his arms with one hand and locked the other elbow about the man's neck. Trevor let out shriek after shriek as he was lifted bodily in the air and carried to the door.

Gissing came running back. With a curse, he aimed the weapon. Olaf swung Trevor in front of him as a shield just as the neuroblast hissed. He staggered with a queer feeling running over him for evidently some of the force had penetrated Trevor's body. The latter had gone limp. Olaf staggered as he supported the man's dead weight with one arm.

"Drop that gun," he rasped, "or I'll break Trevor's neck."

He had already sensed that these last few old men had a reverence for the remnant of human life. It was the reason for their patience with Terkov. They hesitated to work harm on each other and had long ago placed their individual dislikes in the strait-jacket of iron restraint toward each other.

Gissing dropped the weapon. He was

at a loss as Olaf backed toward the villa still keeping Trevor clutched in front of him.

"Mind you don't follow me," Olaf warned, "or Trevor will pay for it."

Gissing was soon lost in the darkness.

Once inside the villa, Olaf dropped the unconscious man and ran for the laboratory. He encountered no one on the way, but Anders was sitting at the receiver with a radio helmet on his head. Olaf entered with bare feet as silent as a stalking leopard. He heard Gissing begin to shout.

Glancing around quickly, he located a heavy stone pestle. With a long bound, he clipped Anders on the side of the head and, as the latter fell over sideways, Olaf attacked the machine in a fury. The stone weapon reduced the plate to fragments.

Evidently not all of the men were in pursuit of the girl. He heard other shouts and the sound of running feet. Leaping to the cabinet, he selected the largest knife in the tray. He leaped through a window just as Terkov and two others came through the door.

Mindful of the neuroblast, he dodged around the front corner of the building. The cedars were heavy on the side toward Avalon and he sprinted for cover. Johnny had said the neuroblast was a short-range weapon, and it was too dark for them to see. He plunged on into the grove, satisfied that he was beyond their reach.

Skirting through the woods toward Avalon, he made a circle and came back to the river. With a burst of speed, he crossed an open meadow with wary eyes seeking signs of the searching party.

Now where would the girl go? Downstream, he decided. She had doubtless been told enough about the plague to keep her out of Avalon and the cemetery. She could go neither east nor west. It had been daylight when she had made the break and, not understanding the neuroblast, she would probably not chance the open valley to the north. There was plenty of thick

woods to the south and, if she had any sense, she would hunt cover at once.

Olaf realized that she must have had plenty of native wit and guile. She would be as elusive as a wild animal. She could probably run like a deer and had been going fast ever since, intending never to return. In open meadows and fields along the stream, he could run at top speed despite the darkness, but when he at length came to dense, heavy forest, he had to slow down.

There was no sign of the men. He didn't know how much head start the girl and her pursuers might have. Given any kind of luck, she could keep well ahead until she wore them out, in spite of their mechanical advantages.

But it began to look like a hopeless task. Had it been day he could have picked up her tracks. As it was, he knew she would run for a time and then use all her ingenuity to baffle pursuit on the morrow. He finally paused and told himself that he was a fool.

She would never keep to a straight course long and had doubtless turned aside before now. He had probably overshot her tracks and would have to hang about until daylight and then go back toward the villa to pick them up. It was a great waste of time.

But he continued doggedly for some time. They had taken her weapons as they had his, and she was defenseless. The night already resounded to the cries of prowling beasts. A lion roared not far away.

"Damn them!" he gritted, for he knew it was useless to call out. They had made her hate him and answering was the last thing she would do. It would also reveal his pursuit. He walked on quietly, listening intently for sounds ahead, but telling himself it was a futile task.

Hunting for a girl who did not want to be found in this trackless forest, was much worse than hunting for a needle in a haystack. A needle at least could not run.

He stopped and looked about for a

good tree in which to spend the night.

Just then a piercing scream came from not far ahead.

Plunging on blindly, he sought the source of the sound, knowing that she was in trouble. He slipped the long keen knife from his belt as he hurdled a fallen log. It was a most satisfactory weapon, of its kind, for the surgical blade was razor sharp.

A moon was rising in the east, obscured as yet by haze, but its feeble light showed him a small clearing ahead.

"Iola!" he shouted.

But there was no answer.

## VIII.

CASTING about furiously, he made out a dim heap on the ground ahead. He heard an agonized whimper from the girl. Two dull orbs turned toward him, and there came the omnious throaty growl of a leopard.

With a bound, he was on top of the heap. Twisting about as he landed, he avoided a murderous sweep of the beast's paw. Next instant he had the leopard by the scruff of the neck and, jerking its head back at a sharp angle, he struck savagely with the keen-edged surgical blade.

There was a blast of hot breath in his face as the brute roared. Claws raked his ribs and shoulder. The first blow had evidently gone home, for the leopard was convulsed and its flailing claws beat the empty air. After a dozen lightning blows, he felt the slinky form relax in his grasp. Dragging the carcass away, he picked up the unconscious girl.

He found the stream nearby and splashed water over her inert form on the bank. After a bit she revived. He sat down beside her, puffing with exertion and anxiety.

"Are you all right?" he queried.

She sat up gingerly. "Ouch! I've got a few scratches," she replied. She bathed an arm silently in the stream and then glanced toward him. The

rising moon was nearing the treetops and some of its light reached them.

"I thought it was you behind me," she remarked. "No one else could have overhauled me that fast."

"I was lucky," he answered.

"What happened to the leopard?"

"He's dead."

"The darned thing dropped on me from a tree when I stopped to listen," she said.

There was a moment of strained silence. He felt self-conscious.

"What did you do, scare him to death?" she continued in her scoffing manner.

"I have a knife," he responded shortly.

"Well, you're quite a man after all," she drawled. "I didn't expect so much. I thought you were something they led around by the nose."

"This is a life I understand," he returned, beginning to feel impatient with her again. "I may be a chump about machinery and such, but there's not much around here I don't know."

"Hm-m-m. Let me look at you," she murmured. "You can't tackle a leopard and get off without a scratch."

"Don't bother about me," he answered. "The main thing is what do we do now? I'm not going back there. I wanted to learn things, but from what I've seen so far, I don't care for that kind of knowledge. You haven't any weapons so you can't stay here. I smashed their machine, but they're liable to stumble on us somehow. They're looking for you."

She paid no attention. Moonlight, pale but sufficient, was creeping down to the water. "You've just torn a leopard to pieces with your bare hands, and I don't want you bleeding to death on me," she insisted. "You might be handy to have around again sometime."

"Stop joking," he said angrily. "Look here, I know you don't like

me, but it will be safer to go on together tonight. Tomorrow we'll make bows and arrows and then you can do as you please."

She was inspecting his shoulder critically. The leopard had made one good swipe in its death throes. "Stoop down here by the water," she directed. "We've got to do something about that. You're bleeding."

"It will stop," he responded. "They're somewhere in the neighborhood with those radio things. We've got to go on."

"Not until I've done what I can," she objected. "Will you stoop down here, or shall I go borrow a neuroblast?"

"Oh, well," he shrugged resignedly.

As the moonlight deepened with the orb soaring high, she bathed the deep gashes the flailing claws had made.

"You're an unmanageable wretch," she murmured.

"I know quite well what you think of me," he retorted. "You've told me plainly enough. And for my part, I think you're a nasty, spiteful, bad-tempered hussy. I'd as soon play with the leopard. You're quite capable of scratching my eyes out, as you promised. But if you try anything like that I'll spank the hide off you."

He missed the little smile that flickered over her face for she had her back to the moon.

"I'm glad we've got that settled," she muttered.

IN SPITE of their bravado, each knew that sleep would be impossible with such wounds. They were glad to relax on the bank and rest awhile. The night was young and there would be plenty of time to travel.

A lion roared again not far away.

Olaf sighed. "I guess I like this life best after all," he mused. "Now take that fellow, for instance. He's a nice understandable sort. You know he'll try to eat you, if he's

hungry, and he'll let you alone if he's not. With my weapons back, I'd feel on even terms. He hasn't any infernal machines to knock you out before he goes to work on you."

"That beast must have cuffed me on the head," she remarked. "My ears ring."

"That's funny," he returned. "My ears itch."

"So do mine."

They considered the feeling a few minutes in silence. It grew more pronounced.

"I wonder what it can be?" she said. "Do you suppose we've caught something? It might be a symptom."

"I don't understand diseases," he replied. "My grandfather was a ship captain. He had been in the tropics. He said he used to take quinine for fever and his head always buzzed. I don't know whether it was the quinine or the fever."

She placed a hand on his forehead. "You haven't any fever, and we haven't had any quinine," she said.

After a few moments, the sensation had grown highly unpleasant.

"There seems to be a vibration in the air," he observed.

"What did you say?"

He repeated.

"Is there something wrong with your voice, too?" she queried. "I can hardly hear you."

He was conscious that her voice sounded far away. Soon some intense vibration was literally shaking them inside and out. Their brains seemed to rattle in their skulls. Frightened, they looked at each other aghast. They tried to leap to their feet, but staggered drunkenly and nearly fell in the effort. The tickling sensation was horrible.

"Oh, it's terrible," she cried. "I can't stand it." She placed both hands over her ears. Then she reeled.

Olaf tried to shout at her, but no sound came. He stared stupidly when he saw her mouth opening and closing in utter silence. She was trying

to say something. Suddenly she lost her balance and fell over sidewise. She remained flat on her face, hands over ears, and he could see she was suffering.

He glanced frowningly at the running water and the black forest round about. There should have been plenty of sounds. But not the slightest noise came to his ears. Everything was dead, utter silence. He picked up a stone and crashed it down a few feet away. He felt a splash from the oozy bank, but not a sound resulted.

Staggering dizzily, he tried to think. What was this thing that had come over them? For a moment there was a twinge of superstitious doubt. It was just as if some malignant spirit had cast the spell of silence over them.

Then a movement down the stream caught his eye. His eyes were still normal, and he saw dark creeping forms. He understood most of it at once. How they had tracked him down and deafened him to their approach, he did not know, but somehow the men were responsible.

He tried to get the girl to her feet and urge her to run. She tried, but was almost helpless. A rage welled up in him at sight of her futile efforts. Then he saw Terkov, in some sort of queer helmet, step into a patch of moonlight only a few yards away. Seizing the knife from his belt, Olaf tried to make a bound forward. Things had gone entirely too far, this time, he raged to himself. But he reeled drunkenly and went sidewise instead of forward.

It was maddening. He was in full possession of his wits and could not keep upright. He crashed heavily and struggled to his feet on rubber legs. Terkov saw the knife flash in the moonlight. Realizing the murderous rage confronting him, he raised his right hand.

Olaf sobbed in baffled rage as his legs continued to play tricks. He

made a few steps toward the men. He knew Terkov had some sort of a weapon. It was a short thick instrument, much like one of the ancient automatics, but very heavy. It had a large reflector of some kind on the front end. Terkov's head disappeared as he raised the weapon and sighted.

Olaf made a last desperate attempt.

There was a sudden terrific, blinding flash. Olaf came to a halt as though he had struck a stone wall. Darkness, complete and awful, had shut down on him. He raised his hands to his eyes. The moon was gone. He might have been shrouded in thick folds of black velvet. The dead silence continued. He wondered what had happened to the girl.

Then the knife was struck from his hands. He groped blindly when he felt hands about him, but he was expertly tripped and thrown on his face. He tried to fight back. Several of them were sitting on him. They had his hands now. Fright generated a sudden fury of resistance. Something hit him smartly on the head and he was dazed.

They soon had his hands tied. And not until then did he remember Johnny's story of millions of deafened, blinded soldiers unfitted for war.

IT WAS much later when he awoke from a fitful sleep. They had been led back to prison in their helpless state. A cot had been fetched for the girl. Olaf had drifted off after hours of worry in dead, black silence. The blackness continued for he had a bandage over his eyes. They had bandaged the wounds he had received from the leopard. But as he moved, now, he heard the creak of a wooden cot. He could hear the mill and slight noises from the grove outside.

"Is anyone here?" he asked and was gratified to hear the sound of his own voice again.

"I'm here," said Johnny's voice from somewhere.

"For God's sake, what have those devils done to us?" raged Olaf.

"They turned a resonator on you from here," responded the old man. "I told you we had lots of things like that left over from the war. It is only a small one because we haven't much power, and they didn't turn it on very strong. Just wanted to deafen you temporarily while they sneaked up on you. We had large ones during the war that would tear a man to pieces if he got the full force."

"You're a lot of fiends," declared Olaf bitterly.

There was a sound of sobbing from somewhere. "But we're blind," came Iola's voice.

"No, you're not," replied Johnny soothingly. "Terkov didn't give you much. It'll pass off. The flash works on the principle of snow-blindness. Contracts and paralyzes the iris of the pupil. You only got a small flash, so the iris will gradually relax. You should be all right by tomorrow."

"You damned maniacs," shouted Olaf. "I thought you were different. How can you talk so calmly about it?"

"They may have us tuned in," warned Johnny.

"Oh, I see."

"Don't know as I blame Terkov," the old man continued. "He said you had a knife and were coming for him."

"I was," admitted the youth. "But I couldn't stand up."

"The resonator destroys your sense of balance, located in the eardrums," explained Johnny.

Olaf fumed. "What can you do against people like that?" he raged.

"Nothing," responded the other philosophically. "After all, those weapons were developed when about twenty million here in the Avalaine were fighting three and a half billion. We had to be merciless."

"But how did they find us so easily? I thought I smashed the receiver."

"You only smashed the glass," returned Johnny with a chuckle. "Left all the vital parts intact. They could calculate where you were well enough."

Iola had ceased sobbing at Johnny's assurance. Olaf felt better, but talking eased the leaden weight of impenetrable darkness. "Do you think they're listening in?" he asked.

"I wouldn't be surprised," responded the old man. "They'll want to know when you're cooking up something like that again. But come here, both of you."

Olaf rose and went toward the sound. He found Johnny's hand and, at a touch on the other side, found the girl. He felt for her hand, seized it, and gave a warning grip which he maintained.

"Get your heads close together," directed Johnny. "The machine can't be accurately tuned at this short distance and three heads create interference." When they had their heads pressed together, he added: "Now don't you two worry. I'm trying to think of a plan. You see how useless your own efforts are. It will have to be strategy."

"Can't you do something to that infernal thing?" demanded Olaf angrily. "It's not decent to have no privacy like this. They pick our very brains like burglars at a safe."

"I might disconnect a wire or two," replied Johnny indulgently. "They might not discover it for a while."

"Go ahead," urged Olaf. "They're going to drive me as batty as Terkov."

"Well, I'll see."

As Johnny turned to go. Olaf asked: "Is anyone else here?"

"No. They know you can't get away now. I think they're all going to bed. It was quite a strenuous chase for old men."

Olaf kept tight hold of the girl's hand as Johnny went out. He drew the girl to him and pressed his head tight against hers.

"I've got to chance the machine," he said quickly. "Think hard about something. Now listen. If you feel your sight returning, I want you to pretend to be blind. Don't let on that you can see until I tell you. Now think something else."

"Isn't it a lovely day?" replied Iola. "Do you think it will rain?"

## IX.

THREE MEALS had come and gone, during a dreary day, and so they knew it was night again. Johnny had delegated himself as nurse to keep them company. Olaf removed the bandages and the old man held his globe over the cot. The youth looked here and there blankly.

"No, not yet," he said. "I can't see a thing."

"Maybe it's a little too soon," agreed Johnny. "But keep the bandages on. The irises retract faster in the dark."

When Johnny left for the night, Olaf rose from the cot.

"Can you see?" queried Iola in a whisper.

"Enough for the purpose," he responded. They knew that Gissing was not back on duty. Olaf took up the globe, which he saw as a dull-gray spot, and went to the other room. He placed a chair on top of the table, beneath a trapdoor he had previously noticed in the ceiling. Mounting, he forced the door with some difficulty and pulled himself through.

The upper story was black, although the moon was coming through a small window to the east. The vanes kept up their constant creaking and, inside the room, a long beam moved steadily up and down. He found it and located several gears below it by sound. He could see the generator because of the bright flashing of sparks in its brushes. After studying it a moment, he went to the walls.

Wide cracks between the logs let in drafts of air. After feeling about the floor, he located a coating of thick gritty dust. With a good hand, he returned to the generator and carefully sifted it into brushes and bearings. There was a grinding noise and a strong smell of burning iron. Little flames flickered up as the machine grew hot. He jumped back as one of the bearings burst and the generator tore itself to pieces.

He climbed down again with satisfaction.

"You can think all you want to," he told the girl. "I've spiked most of their guns. Their devilish inventions depend upon electricity. They'll not be so lucky next time we make a break."

A short time later, Terkov and three others appeared at the door. The pair were released from their barred prison, and, still with the bandages on so that they stumbled frequently, they were conducted to the villa.

"What is this?" asked Olaf as they were led into new quarters.

"One of our best rooms," responded Terkov. "We've fixed it up with the best we have."

"Oh, the bridal suite!" Iola was still scornful.

"And, if you attempt to escape again," added Terkov with sinister intentness, "you will be blinded and deafened permanently so that it will be utterly impossible thereafter. We hope you will not make it necessary."

"Evidently we have no choice in the matter," remarked Olaf bitterly.

"Certainly not," retorted the leader. "The future of the race is not at the mercy of your personal whims."

When he had stalked out and locked the door, Olaf removed the bandages. A globe illumined the room which was fairly well furnished. There was but the one door. He surveyed the windows intently.

"Not so bad," he mused. "They think we are still blind. I think I can work the catches on these windows. There is heavy glass here, instead of bars. The resonator and receiver are out of commission. The neuroblast has but one charge left. If I can slip out and locate that flash thing, we'll be nearly safe."

"Can't we try it now?" the girl asked anxiously. "They'll know we're not blind soon, and then they'll have a guard at the window again. It may be our last chance."

"It's not even half a chance," objected Olaf. "The leopard nearly got you as it was. What would we do out there with you still blind and me nearly so, neither with any weapons? I've got to locate our weapons first and smash theirs."

"That fiend, Terkov!" hissed the girl. "He's capable of blinding and deafening us to keep us cooped up here like a pair of breeding organisms."

"Like the what-is-it in a glass case," agreed Olaf. "It had no senses, either. He said it was the concentrated essence of sex. If I ever get a good chance, I've a notion to stretch his neck out a foot long."

"It's going to be horrible."

"It all depends on that window," Olaf decided. "But we've got to have more privacy. I think we should pretend to fall in with their plans. If they think everything is working out nicely, they may get careless. They may not even post a guard."

"All right . . . for the good of the cause," she replied. "But remember, I've got my fingers crossed."

OLAF WENT to the window. He could see well enough to inspect the catch. There appeared to be no difficulty. Opening the window, he leaned out to sniff the air. After several minutes, he decided that there was no one about. He slipped out

and crouched in the shrubbery awhile. When nothing happened he stole off toward the laboratory, using all of his trained woods sense and stealth.

Terkov was there alone. From some distance away, Olaf surveyed the interior, wondering where they would keep the flash gun. He could see it nowhere about, but knew that his sight was not yet normal. Most things were still in inky shadow. The narrowing of his pupils had caused the brightest lights to focus in such hard sharpness that they hurt his eyes.

He made a cautious circuit of the building, not knowing where any of the men slept. The neuroblast was so constantly in Gissing's company that he decided to try and find where the man was. The weapons might be kept together and Gissing might be the clue.

At some risk, he peered in several dark windows. Taking a chance on one, with the dim oblong of an open door beyond, he slipped over the sill. Almost instantly there was a flash of light. He had stumbled upon Gissing by chance. The latter had been sleeping in this very room with his globe covered by a tight hood. As Olaf saw the man's face materialize out of the darkness, he knew he had erred.

He plunged forward swiftly at sight of the neuroblast.

Iola was waiting in breathless impatience. Finally there were sounds of feet in the hall. She glanced around desperately wondering how to call Olaf back and prevent the deception being discovered. But the door opened and four of them came in carrying Olaf, who was unconscious. They laid him on a couch and went out. After a while, he recovered and felt of a bump on his head with disgust.

"What have they done to you now?" queried the girl.

Olaf was downhearted. "Shucks,"

he responded. "I stumbled on Gissing by accident. I rushed him to make him shoot me with the last charge in the gun. But he fooled me. He clipped me on the head with it."

Terkov came storming in with others on his heels. With Gissing and the neuroblast standing guard, they forced Olaf down on the cot while Terkov made a swift examination. Holding his globe close, he pushed back Olaf's lids and peered at the irises.

"Pupils already retracting," he said savagely. "I warned you. Now you have just one more chance. Don't play any more tricks like that. You can't fool us forever, and if you continue to cause trouble we'll have to assure ourselves that you can't."

When they had gone, Olaf sat for hours in gloomy thought.

"Well, that chance is gone," he said glumly, knowing that the door was locked and Gissing was posted once more outside the window. "I don't know what to do, short of murder. I suppose I could catch Terkov off guard long enough to wring his neck. But the others would get me."

"We'll think of something," the girl said to cheer him up. "We've got to."

"It better be good," he replied grimly.

NEXT MORNING Johnny drifted in, as companionable as ever. They were allowed to have the window open, but Anders, with the weapon, was sitting a few feet away.

"They've discovered the wires I disconnected," whispered the old man, "but something has gone wrong with the receiver. They're working on it."

Olaf started. In that case they would soon be tracing down the trouble. No telling what complications might ensue at Terkov's rage over the ruined generator.

Johnny was delighted to find the pair sitting close together apparently on terms of friendship at last. He beamed and rubbed his hands together complacently.

"You know, it's not bad here," he said. "Used to be a park. This was the clubhouse. I think you're going to like it. It's comfortable, and we've felt safe. There's never been any evidence of the plague."

Olaf desired to keep Johnny talking for he often let slip things of value.

"I still don't understand some things," mused the youth. "You said one time that medical science was able

to cope with the plagues in Avalon and that they never became serious. What killed everybody?"

"Measles," responded Johnny soberly. "The one thing we couldn't foresee and didn't expect. We didn't know what it was when they struck us. We thought the measles were extinct."

"What are measles?" asked Iola.

"Tsk, ts, tsk," Johnny chuckled with a queer helplessness as though his task as instructor had turned out to be more than he could cope with. He explained the disease to the girl.

"You have no idea how awful things were," he told them. "The lucky one



"It doesn't do any good," he said gloomily. "We've got the plague . . . and that means a few hours to live."

are out there in Elysium. They got buried. There was no one to bury the last ones. They had to lie wherever they passed out. Avalon is full of bones. That's why the plague is as deadly today as ever."

"Are the measles so deadly?" asked the girl.

"It is now," the old man returned forcefully. "You see, the human constitution has the power to wear down disease organisms in time and create immunity. In ancient days the measles were a terrible scourge that wiped out populations wholesale. By the beginning of the twentieth century, it was only a mild disease. By the middle of the century, it was stamped out."

Olaf's forehead puckered. "How did they get here?" he asked.

"*Tsk, tsk, tsk.* The war. I told you about the war," responded Johnny. "We hadn't *all* the scientific brains in the world. We were winning out, but our enemies were more ruthless than we were. They experimented with those germs and even improved on them.

"Projectiles, rockets or ships couldn't get through our neutrality zones and the infrared barrage, so they shot rockets loaded with measles cultures into the zenith. They had only to calculate how high to shoot them and the turning of the Earth on its axis brought them down here in the Avalaine.

"They went up under power charges, but they came down by gravity. We had no defense against projectiles falling silently from the zenith. About forty landed before we knew what was going on. They burst high in the air and flung canisters far and wide, which burst in turn with a light charge near the ground. The germ cultures were in bright-colored little capsules that attracted the eyes of children. They played with them and broke them open to see what was inside.

"By that time commerce was dead. We had cut ourselves off from the source of medical supplies. We were

out of everything, too. The measles spread like wildfire and there was nothing we could do. In three years Avalon was an empty city. Out of ten million there were only about twelve hundred left. The others have died off since in the ordinary way or from the occasional outbreaks of the plague. It breaks out every so often. We hadn't had measles for a century, and immunity was gone."

"Horrible," said Iola and went to the window.

"But if there were people left to shoot at you," said Olaf, "there may be some there yet."

"Oh, no," responded Johnny positively. "We calculated where those rockets were coming from—it was the last remnant of the Mongol Empire in the interior of China. We turned a hundred and fifty rockets into the zenith, loaded with a thousand pounds of detonite in each. When that hundred and fifty thousand pounds landed, there was no more Mongol Empire.

"You can still see cracks in some of the buildings in Avalon from that shock. It caused earthquakes all over the world. Tidal waves. Cyclones and various atmospheric disturbances. Even here on this side. For a while we thought the Earth had turned over, for we had nearly a week of almost total darkness. The finer dust went so high that, as the Earth turned on its axis, that dust cloud was wound seven or eight times round the globe."

Iola was apparently trying not to listen. One hand in straying idly about had found a bit of shrubbery. She was toying with it. Anders, outside, glanced at the leaves in her hand.

"Don't touch that," he said curtly. "It's poison ivy."

The girl drew back her hand as if stung.

Olaf was still probing for deadly secrets. "Have they any more of those infernal machines?" he asked. "Things we haven't seen yet?"

But Johnny shook his head.

"I guess you've had the works," he answered.

## X.

OLAF AWOKE after a brief uneasy sleep troubled by nightmares. There was a queer sound in the room. He glanced over at the other cot. Iola was tossing restlessly, and groaning. Thinking of the dreams that had tortured his own slumbers, he lay a few moments undecided.

"Iola," he said to waken her.

She did not respond.

Getting up, he took the globe and held it over the cot. It was not yet quite daylight outside. He saw that her eyes were closed, but her lips were moving as though she were trying to talk. He shook her and then stood back at a loss. Speaking to her had no effect, either. She looked ill. A closer inspection showed some little red blisters on her face. As she moaned again, he realized that she was suffering.

Rushing across the room, he pounded on the locked door.

"Johnny! Terkov!" he shouted.

He continued to pound and shout and then lifted a chair which he crashed against the door. He continued until he heard steps outside.

"What's the matter in there?" demanded Gissing's angry tones.

"Iola's sick," he shouted. "I can't wake her."

Gissing opened the door and came in. He took one look at the girl and fled in panic. In a few moments there were excited voices and the sound of bare running feet.

Terkov appeared and, after a suspicious glance about the room, approached the girl. Johnny hung in the doorway. Others were behind him, watching in alarm. None of them said anything. The leader needed no more than a glance. He started back from the cot with face twitching.

"Gissing is right," he stammered.

"It's the plague again."

As Olaf took a step forward, Terkov whirled upon him with hands upraised. "Stay away!" he cried hysterically. Skirting around the youth, he headed for the door. "The rest of you get out," he told them.

As the others left in haste. Terkov paused with hand on knob. "Have you ever had the measles?" he demanded of Olaf. As the latter shook his head, Terkov went on: "Well, we can't chance it. The girl was evidently infected when she arrived. You've been exposed. You'll have to stay here."

And whipping through the door, he slammed and locked it behind him. Olaf paced about the room uneasily. Daylight was fast growing. Iola was quieter. What to do about such a situation, he knew not. After a while there was a timid knock on the door and Johnny thrust a hand through the opening with a glass of some amber fluid.

"Give her this," the old man directed. And, as soon as Olaf had taken the glass, the door was shut and locked again.

Olaf raised the girl's head and held the glass to her lips. It revived her.

"I don't remember asking for a drink," she told him tartly. "Oh, I've a headache. I'm dizzy," she ejaculated as she tried to sit up.

He set the glass down on the table and regarded her with troubled eyes. Going to the window, he watched the sunrise with a frown.

"What's the matter, and why are you pouring things down me?" she queried. Rising unsteadily, she came toward him. A glance out the window showed her nothing of interest that he could be mooning at save Gissing, who had taken up a belligerent posture beyond the window, legs wide apart, weapon uncompromisingly clutched in both hands. He was frowning.

"You two look like you've been making faces at each other," she remarked.

"You'd better lie down," he replied, gently.

"But I just got up," she objected.

"What's going on here, anyway?"

He did not know what to tell her.

"Are there mosquitoes around here?" she asked.

He looked at her in perplexity.

"You've some red spots on your face," she explained.

He stared at her in alarm. Stepping quickly to a mirror, he peered earnestly at his reflection. She was right. There were a few small, watery, red pustules.

SOME TIME later, the door opened abruptly. "Come out here," directed Gissing roughly, keeping the neuroblast pointed at them steadily. Both did as he requested, wondering what it was all about. He kept well behind them, but urged them on toward the laboratory at a fast pace. There they found all the old men collected. A meeting of some kind was in progress. They had been arguing something and one or two were angry.

Gissing shepherded the pair to a position at one side and remained guarding them alertly while he glanced at Terkov who stood alone facing the group.

"Long ago we discussed this situation and came to a decision," began the latter. "But since that time another matter has come up. The choice at this time is of such importance that it behooves us to think clearly."

"Get on with it," put in Gissing sourly. "Every minute counts."

"A vote has been taken," continued Terkov, unruffled. "We seem to be about evenly divided. I have not yet cast my vote. It may be a deciding vote, and it may be a tie. In the latter case nothing will have been gained and so it is important that we consider this matter from all sides in case anyone wishes to change his mind."

"Quit making speeches," interrupted Trevor impatiently. "I tell you, we'll have to split up and scatter for a time. The survivors, if any, can get together somewhere else later."

"That is one point of view," agreed Terkov. "On the other hand, there is our decision of years ago. At that time we decided that, if the plague were to break out again, the sternest remedies would be necessary. In the lack of all medical facilities it were better to sacrifice the victim than to endanger the group."

"There are five to go and six to remain," he told them. "That makes mine the deciding vote. And I say REMAIN! That makes it seven to five. The victims must be eliminated."

"The decision has been reached and the course agreed upon," continued Terkov coldly. "In the interests of the group, any victim of the plague must die."

Olaf glanced at Johnny and found no help. The latter was eying Terkov steadily.

"Let's get it over, then," muttered Trevor.

They shifted their feet uneasily.

"But Mr. Terkov," said the girl. "What are these red spots on your face?"

Gissing whirled as though prodded by a point. He took a quick step toward the leader and scrutinized the latter sharply. Terkov's black eyes widened as he stared at the girl aghast. A hand fluttered to his temple.

"Why . . . why—" he stammered, and cast a quick look of fear at those about him.

"She's right, Terkov," Gissing said savagely. "You've got it, too. That makes three. It was you forced this decision."

Terkov seemed to deflate like a punctured balloon. Into his eyes crept a look of horror. His face twitched. He seemed as yet unable to grasp the full import of the situation.

Then he let out a sudden shriek, and with a bound had wrested the weapon from Gissing's hands. He swung it on the group.

"Keep back!" he screamed, the light of madness in his eyes again. "I'm not going to die. You can't kill me!"

Olaf pushed the girl behind him. He whirled and struck swiftly. As Trevor went crashing over a table, the youth darted forward and swept up the flash gun. There was an outburst of excited cries. Gissing swore, but was helpless. Johnny pushed back his errant lock aimlessly.

Terkov turned upon the youth and aimed the neuroblast. There were shouts from the crowd. Gissing flung himself flat on the floor. Others crouched over with hands pressed tight to their eyes. With a sudden bound, Johnny was in front of Olaf.

"Run, you two. Get out!" he shrieked.

As Terkov pressed the trigger, the old man collapsed in a limp heap and fell face forward. Terkov saw that Olaf was untouched. With a baffled cry, he drew back his arms to hurl the heavy weapon.

There was a blinding flash.

Darkness shut down like a lid. The reflector shielded the eyes of the wielder and those behind it, but the walls had flung back a blinding glare. There was a confusion of shouts. Turmoil for a moment. Olaf sought for and found the hand of the girl.

As he headed for the door, he bumped figures in the darkness. He brushed them off. Terkov was screaming. He had caught the full blast.

While the men milled about with futile cries, Olaf stumbled to the window and helped the girl crawl through. They stepped out in hot, black sunshine. By mere instinct, they found the path past the mill.

The last thing they heard was Terkov's hysterical shouting. "Fools! Fools! I was the last hope of the world. And now it's gone. All gone!"

MILES AWAY, they slowed down to a comfortable walk.

"Can you see all right, now?" asked Olaf.

"Fairly well," she responded. "Enough to keep going, anyway."

"What's the hurry?" he asked as she brushed by him and took the lead. "They aren't going to pursue the measles."

"I know. But the city is still in sight. Of all the places I never want to see again, this is tops."

He was moody as they continued. "I hope the flash didn't get the others," he said. "Especially Johnny. I didn't know how to work the thing. May have turned it on full blast."

"I can't sympathize with any of them," returned the girl. "They're responsible for all this."

"Not exactly," he objected as he followed her. "If science had been financed in the first place, scientists would have turned their discoveries to good and progressive ends. It was the promoters trying to grab everything who caused all the trouble."

"If it hadn't been for the scientists, the promoters wouldn't have gotten anywhere," she shrugged. "Let's keep going."

"What's the difference?" he asked. "We probably haven't long. From what I've heard, the plague works pretty fast. We might as well be one place as another. I feel sick."

"It's only your imagination," she told him.

He was silent for some time.

Finally: "I know you hate me," he said. "But do you mind if we stay together—uh—that long?"

"Are you sure you don't think I'm a nasty little spitfire with a bad

temper?" she flung back over her shoulder. "Wouldn't you rather have a nice leopard?"

"I never did think that," he insisted. "You do get me riled. But, you see, I listened to you quite a bit before you showed up. I couldn't understand you at all after that."

"Do you think any girl would want a lot of crazy old men experimenting on her?" she demanded.

"I guess not."

She halted and swung about, bringing him to a stop. For a moment she surveyed him critically. "I don't hate you," she said calmly. "I thought at first you were part of that scheme. I know better now."

"Then you don't mind if we . . . if we stay together until . . . until—"

She stirred the soil with a bare toe and glanced up demurely. "You're taking on a large contract," she murmured. He saw there was a smile lurking behind her eyes.

"Don't joke about it," he said solemnly.

"Let's sit down on the little bank here," she suggested. "I guess we can afford a rest. Now, isn't this nice?"

He relaxed with a sigh. He cast a glance at the sun-dappled forest round about. She studied his gloomy countenance until the smile crept through again, and she burst into laughter. He turned a hurt glance upon her.

"How can you be like that?" he reproved her. "Here we are, free again. It's a wonderful world and a beautiful day. And it may be only a matter of hours."

"But, silly, we aren't going to die," she exclaimed.

He examined the spots that had appeared on chest and shoulders. It itched terrifically, but he knew he shouldn't scratch it. He squirmed instead.

"Don't tell me this is imagination," he said severely.

"It'll itch like the deuce," she said, "but we'll get over it. Didn't you notice those red berries and the sprig of poison ivy outside our window? I got the idea as soon as Anders mentioned it. Your plan fell through, so something had to be done."

"So?" he queried frowningly.

"So I took some of the red berries and some of the ivy," she confessed. "The berries make the color and the ivy makes the little blisters. I've had a lot of experience with poison ivy. I crushed out the juice after you had gone to sleep. I sprinkled it on myself and put a little on you, too. It worked very well, don't you think?"

"But Terkov?" he exclaimed.

She was instantly sober and her eyes became grave.

"Oh," she murmured. "That may be the real thing. He went into Avalon, you know. I didn't put anything on him, but I don't think it's anything more than poison ivy. They've been around there, and going into Avalon for a long time, and I should think that anything—even measles—would die after a while. He went into the woods after us, you know, and the old fool's no woodsman. He probably blundered into poison ivy, too."

# THE OTHER SIDE OF ASTRONOMY

*Anecdote and incident on how to be  
an astronomer and why not to be one*

By R. S. Richardson

*of Mt. Wilson Observatory*

FOR some reason astronomers seem to interest the public more than any other type of scientist.

Just why they should have more glamour than a botanist or an ichthyologist has always been a mystery to me, but the fact remains, nevertheless. Astronomers themselves are generally ordinary enough individuals, quiet law-abiding citizens, interested in their homes and families, and the number of miles they get to the gallon of gasoline. An astronomer would be a good man to have for a neighbor.

What makes a person want to devote his life to the study of the stars? I don't know. A woman once lived next door to us who had the greatest enthusiasm for the embalming business. You are either born with a love for it or you aren't. In my own case, I can't remember a time when the starlit sky didn't fascinate me. I have asked other members of the profession about this and their answers are all pretty much alike. They went into it because they had an instinctive desire to explore other worlds than ours that couldn't be resisted.

The question of how you get started as an astronomer used to worry me a lot. If you wanted to sell insurance, or groceries, or secondhand cars, the answer was obvious enough. But you couldn't go up to an observatory, knock on the door, and inquire if they needed another man. Finally I wrote to a dozen leading astronomers and asked them all about it: how do you begin, which field offers the most opportunities? All except one

was encouraging. Astronomy was an excellent profession, there were many splendid opportunities for young men, by all means go into astrophysics.

The lone exception was Dr. Edwin B. Frost, formerly director at Yerkes, who became blind during the later years of his life. He said that, while he could not deny the delights of astronomy, at the same time it required at least eight years of preparatory training, and afterwards probably nothing better than a teaching position at low pay. Looking back his words sound unduly pessimistic, but out of the twelve I think his advice was the most accurate statement of things as they are.

Students who desire to become professional stargazers start in by going to an institution with a strong astronomical department, such as Princeton, Harvard, or California. During their four years of post-graduate work they make the acquaintance of noted astronomers and visit the biggest observatories whenever possible. The high point of a graduate student's career is his thesis on some problem he has worked out by himself—usually one to which he knows the answer already. His paper is carefully read by the members of his committee, and after being officially accepted, is filed away in the gloomy archives of the university's library, where the light of day seldom penetrates. After that he is perfectly free to look for a job wherever he thinks he can find one.

PRACTICALLY all the large observatories in this country are the gifts

of wealthy men. An incredible number of multi-millionaires have left their fortunes to the advancement of a science almost devoid of practical benefits, sometimes to the consternation of friends and relatives. Perhaps after a hectic life in Wall Street their thoughts turn to the abstract and intangible. When Andrew Carnegie, whose money built the telescopes on Mount Wilson, was told they had revealed stars never recorded before, he replied that this alone justified their construction.

The Lick Observatory came about in a peculiar way. It was the result of a gift from Mr. James Lick, a wealthy Californian long noted for his eccentricities. The telescope is situated 4000 feet above sea level on Mount Hamilton overlooking San Francisco Bay in the distance. Why Mr. Lick chose to leave his money in this way will always remain a mystery, for there is not the slightest evidence that he had ever looked through a telescope or had the least interest in the stars.

At first he had toyed with the notion of erecting a large number of statues of himself, the idea being that in centuries to come they would be prized as valuable relics, like the statues of ancient Greece and Rome. But later this was abandoned in favor of building the biggest telescope in the world. When confronted by estimates of the cost of such an instrument, however, his enthusiasm cooled considerably. The price of the equipment amazed him. In particular, he could not understand the necessity for so elaborate a mounting. Why not simply fasten the lens onto a long pole or high tower of some sort? While they were trying to straighten it out, Mr. Lick died, leaving the trustees free to go ahead with their plans. He has been peacefully sleeping under the pier of the 36-inch refractor for sixty-two years now, apparently well pleased with the way it all turned out.

People who fall into the error of thinking that because astronomy deals with the heavenly bodies, and that, therefore, astronomers must live on a more exalted plane than other mortals, would have been disillusioned after about one day at Lick in the 'gos. Although that was long ago it still remains the best example I know of the handicaps under which much of the best astronomical research has been—and to a lesser degree, still is—carried on in the United States.

ALL SUPPLIES to Mount Hamilton had to be hauled by stage twenty-six miles from the nearest town to San Jose. Provisions were ordered over a single precious telephone line, and if the order was forgotten, or the line broke, you simply went without. Fuel had always been a problem at Lick, for the region is very sparsely wooded. One year they were reduced to picking it up along the road and delivering it in parcels like express packages. It was hopeless to try to keep the houses warm in winter; often they became so cold the water froze on the dinner table. Many of the dwellings had defective flues, and when the wind blew from a certain direction, the flames shot several feet into the room, filling it with soot and smoke. This often made it necessary to eat in the halls and bedrooms.

To add to the complications, the water supply occasionally ran low, forcing them to drink the same water that had been used to raise the floor under the 36-in. Since it has passed many times through the water engines and hydraulic rams, it was covered with a heavy film of oil, making it sickening stuff to drink. But it had to be drunk because there was nothing else available.

Another formidable problem was the matter of haircuts. Opportunities to visit San Jose were extremely rare, with the result that the astronomers had to be their own barbers. Those

who became fairly expert at it often found their services much in demand. Fortunately this was long before the day of bobbed hair.

To carry on research under such conditions called for courage and resourcefulness of a high order. But they went steadily ahead. Barnard discovered Jupiter V, Burnham measured the position angles of double stars, and Keeler photographed the extra-galactic nebulae, despite the fact that there was no meat in the house for dinner, and the pipes had burst in the bathroom.

A serious disadvantage to the plan of both living and observing on the mountain, is the education of the children. Although a schoolhouse was early provided on Mount Hamilton, the State will not furnish a teacher unless a certain minimum number of pupils are available. Which once led the observatory, in desperation, to advertise for a carpenter with five children. And the difficulty arises again when the children reach high-school age.

If the men who made history at Mount Hamilton could return today, they would find steamheat and electricity, and San Jose with moving pictures and beauty shops only a few hours away. But even with modern conveniences, life on an isolated mountain-top can be trying at times. Snow may block the road so that groceries have to be packed up by foot. And I distinctly recall as late as 1930, that it was always advisable to get a haircut on going to town.

AT Mount Wilson, on the other hand, the instruments are on the mountain 6,000 feet high, but the offices of the observatory and the astronomers' homes are in Pasadena, just below. Trips are made to the mountain only when the men wish to observe. A program is made out three weeks in advance, telling each man when he will have the exclusive

use of the sixty or hundred-inch telescopes. Generally each astronomer devotes about ten days out of the month to observing. During this time he lives at a building provided by the observatory called the Monastery. How the name originated is unknown. One explanation is that it was because of three of the men who first lived there: Abbot, Monk, and St. John. Here the astronomers eat, sleep, and generally pass the time when not at work.

Life on Mount Wilson moves along smoothly in clear weather, but a prolonged cloudy spell can really get you down after a while. All the little faults in you and your fellow inmates come to the surface. Somebody's habit of always mispronouncing the same word, or the way he eats his pancakes. One of the best features of the Mount Wilson system of observing on the mountain and living in town, is that you never get to see too much of any one person. The faces around the dinner table are always changing. Some of the men take the gloomy weather good-naturedly, but others are not so philosophical. They may want to photograph a variable star at a particular phase of its light curve; or perhaps their stars are beginning to get away from them, vanishing into the dawn. In which case, they eagerly listen to the weather reports over the radio, and get hopeful if a patch of blue sky momentarily appears.

On rainy days I always think of the late Dr. Francis G. Pease, who was the first to measure the diameters of stars with the interferometer and worked with Michelson on the velocity of light. Clouds never seemed to bother him in the least. Hour after hour he would read by the roaring fire, while the fog drifted monotonously through the pine trees. He was very fond of pulp fiction and kept a stack of thrillers in his room at the Monastery. I know this sounds like logrolling, but I am sure his

favorite was *The Shadow*. He never seemed to tire of following that elusive individual.

If you really want to get an astronomer at Mount Wilson launched on a speech, accompanied by gestures, just ask him how he thinks the visitors to the observatory should be handled. In the old days, when everything had to be packed up over a narrow trail by mules, strangers were seldom seen on the mountain. But now a high-gear road makes it an easy drive from the city, so that around 75,000 people come up every year, and the best way to look after them has developed into a real problem.

These people are naturally anxious to see everything and are disappointed and often angry when they find all except a few of the buildings closed to them. Ordinarily well-behaved men and women, no doubt highly respectable members of the community, seem to have no compunction whatever when it comes to breaking into an observatory.

I distinctly remember one old fellow who made an investigation of the suntower where I happened to be working. First he tried all the doors and then windows without success. After a few more attempts I heard him yell to someone: "Can't get in here either. This is the locked-uppest place I was ever at."

Friday night the sixty-inch reflector is turned over to the public, but it is hard to make many people understand why they can't come in and take a look any time. They fail utterly to realize that an astronomer's office hours are at night, and a delay of even half an hour may upset his program entirely.

Another frequent interruption is from phone calls. You are working high up at the Newtonian focus of the 100-inch and the telephone rings. Well, let it ring—I'm busy. But then you get to thinking. It might be a telegram. Perhaps a member of the family has had an accident.

So you climb down thirty feet in the dark and grope your way to the phone. Only to find that a cross-word puzzle addict wants to know the name of the 403rd asteroid. Or if it isn't that, it's where was the Moon last night, and what is the precise velocity of the Earth in its orbit. Those who believe the heavenly bodies exert an influence on the performance of the thoroughbreds at Santa Anita would like to know the time the Sun rises for every day of the racing season. But the prize should go to the woman who came to the sixty-inch one day and tried to borrow a pencil so she could write her name on the building.

BUT only a part of the time is spent on Mount Wilson. During most of the month the astronomer comes to his office in the morning and works at his desk much the same as a business or professional man might do. Here he examines the plates taken at the telescope, makes calculations, reads, writes, talks over his observations with others. Probably the most noticeable difference between a pure research institution and a business office is the more leisurely pace of the former. There are no deadlines to meet or orders to be filled by a certain date. The stock market won't slump if the Wolf sunspot numbers aren't done by the first of the month. Research is best conducted in an atmosphere of this kind, free from distractions and excitement. Which must not be taken to mean that astronomers can't turn it on when they have to. On an eclipse expedition, the strain of setting up a mass of machinery on a desert island, and making sure it will work during totality, can be quite as hard on the nerves as a business conference.

Astronomical investigations frequently involve long calculations of a rather routine nature which are usually turned over to women computers. Wives who can't keep their checking

account straight would be appalled at the sight of mere girls taking logarithms, sines, and cosines out of a trigonometric table as casually as one would look up a telephone number. Determining the orbit of a comet or checking up on the distance to the Virgo cluster are just a part of the job.

Rather curiously, astronomy attracts many women, the number of women graduate students sometimes exceeding the men. And although they do quite as well as the men, very few ever become professional astronomers. For after working eight years to get a Ph.D. degree, and acquiring an enormous amount of highly specialized knowledge, they almost invariably end up by marrying one of the men students and becoming a housewife. All of which can be very discouraging to a university after it has granted them a fellowship of \$1000 to help them be an astronomer.

One often hears surprise expressed at the matter-of-fact attitude astronomers take toward their work. People expect them to regard the stars from a sentimental standpoint, as blazing balls of fire scattered over the firmament, rather than numbers in somebody's catalogue, or dots on a photographic plate. Thus one may

think of Antares as either the flaming red star that marks the heart of the Scorpion; or as No. 22157, mag. 1.22, type Ma, in Boss' General Catalogue. The first designation is more picturesque, but the latter is much handier for reference purposes.

Similarly, the extra-galactic nebulae are not island universes at all, composed of millions of suns, each with its retinue of planets, and satellites, and inhabitants. They are smudges on a film of gelatine—little hazy patches on a photographic plate, to be marked with pen and ink, numbered, and recorded in a notebook. Perhaps at times the astronomer may reflect upon the significance of his work. But more often he gazes upon his photographs of the heavens with the same detached air that an employee at the mint looks at a gold brick.

Lest the reader get the impression that an astronomer's life is made up chiefly of petty annoyances and routine calculations, which it is not, perhaps we should take a look at the brighter side, and see how a first-class astronomer rides over the obstacles in his path.

ABOUT 1915 Dr. Charles E. St. John decided to undertake the task



of detecting the third Einstein effect in the solar spectrum. According to the general theory of relativity, the spectrum lines in the Sun should be shifted by minute amounts toward the red of their positions in the laboratory, the amount of the shift increasing with increasing wave lengths. It was barely on the limit of visibility, but with the powerful equipment that had just become available on Mount Wilson, it seems worth going after. At any rate, he would be shooting for big game.

Now St. John was not your master-mind type of scientist with all the facts of nature at his fingertips. Instead you always had to watch him a bit to see that he kept out of trouble. About every so often he forgot where he had parked his car and had to call the police to help him find it. And he was constantly dropping screwdrivers and wrenches into the spectograph endangering the delicate optical parts therein. Most of his misfortunes arose from his intense concentration on the particular job he had set for himself. He thought about it so hard that the rest of the world ceased to exist.

The most trouble was anticipated from the high pressure in the Sun's atmosphere, which at that time was believed to be five atmospheres or more. Pressures of this order would broaden the spectrum lines and completely mask the relativity shift. But this was true only for *atomic* lines; those arising from *molecules* were hardly affected by pressure. So, St. John carefully selected forty-three lines in the spectrum of the cyanogen molecule, CN, one of the strongest in the Sun. (Yes, chemistry experts, I know that formula looks funny. In the Sun at a temperature of 6000°K you get only *fragments* of molecules

TiO, CaH, and MgH—and not the ones encountered in the laboratory.) He compared the positions of these lines with those of the iron arc under standard conditions. The reduction

of the plates by him and his assistants took several years. Their final conclusion was, there "is accordingly no evidence in these observations of displacements in the direction of longer wave lengths, either at center or at limb, of the order of the 0.008A required by the equivalence principle of relativity as developed by Einstein."

But in the meantime, the conception of the solar atmosphere had been undergoing a profound change. By 1923 there were powerful reasons for believing that pressures in the outer layers of the Sun, instead of being greater than those in our atmosphere, were in reality only a thousandth as much. If so, their effect upon the spectrum lines could safely be neglected. Furthermore, on closer investigation his forty-three hand-picked cyanogen lines turned out to be the worst he could have chosen. They were closely blended with other lines, very faint, but still strong enough to cover up the red shift. Later he referred to them as "the forty thieves."

So he began all over again, this time with 500 iron lines distributed throughout the entire visible solar spectrum. One source of error after another was run down and eliminated: pole effect in the iron arc comparison, convection currents in the Sun itself, and the strength of lines at various depths in the Sun. And now things began to fit into place. In unmistakable terms, his measures were showing the red shift of relativity, the slowing down of the atomic clock in the Sun. Eventually, after fourteen years, he was able to announce another confirmation of the Einstein theory, along with the advance in the perihelion of Mercury's orbit and the displacement of stars at the Sun's limb during a total eclipse.

ARE THERE astronomers who would make good characters in a science-fiction story? Yes, I think there are many who would easily

qualify, and also enjoy the rôle immensely. Secretly they would like nothing better than to hear that a genuine rocket from Mars had landed in their backyard. And a few signals from Venus or a close brush with a comet would pep up anybody's observing program. For it is action—change—new effects—that make an object less interesting.

Looking ahead to 1941, we see the 200-inch mirror in operation on Mount Palomar, and the 100-inch on Mount Wilson, the largest now in existence, shoved down into second position. Already important work on supernovæ has been done with the 18-inch Schmidt camera on Mount Palomar during the last three years. All the finest astronomical apparatus that experts can devise—and the budget will stand—are being concentrated on that mountain-top. Lecture halls and observation booths for the visitors. Temperature controlled developing and ammoniating rooms for sensitizing the plates to the deep infra red, a laboratory, a reading room, and a lunchroom and kitchenette, will make the astronomers' work more comfortable. (The day of the cocktail lounge is still in the future.) Telescopes driven by synchronous motors and the settings in right ascension and declination made as easily as dialing a telephone number.

And work is still in progress on even greater conveniences such as automatic controls in right ascension and declination. This would free astronomers of their most tiresome task today: that of guiding hour after hour on a star trying to keep it at exactly the same point on the photographic plate. The process of guiding is relatively simple, and once mastered, soon becomes monotonous in the extreme.

There is a strong trend at present toward bringing the accessories of the telescope to the highest point of perfection, thus freeing the astronomer of much of the drudge work of former days. But some of the older men shake their heads. They predict it will take more time to keep all the newfangled gadgets in running order, than it would to do it by hand in the old-fashioned way. At any rate, it is doubtful if we will see many entries in the record book similar to one made by one graduate student at the old Princeton Observatory, who is now a dignified director. It was written at a temperature of  $11^{\circ}$ , and reads:

"Driving clock froze, dome froze tight, reading lamp busted, phone won't work, sidereal clock played out, belts off, fuse burned out, shutter can't be closed—vale!"



# GENERAL SWAMP, C.I.C.

Concluding a two-part serial of men against men—and the world-girdling swamps of Venus.

By Frederick Engelhardt

## Synopsis :

Brand Martel, a young Venusian colonist and a leader of the planetary independence movement, is forced to flee his native colony of Arkgonactl when the American-Venusian Corporation, a private company chartered by the Confederate States of the Americas, on Earth, to exploit the colonists, seizes complete control of the archipelago.

With Jack Green, his sergeant in the Venusian army corps during the late wars on Earth, and Tom Dorgan, a hard-bitten swamp runner, Brand escapes on his yacht after luring a "Corp" guard ship to destruction. With other fugitive rebels, they go to the colony of Torgutkluck, where the uprising against the Corp has been successful.

Brand, an experienced soldier, is given the task of whipping the proud, independent, mercurial Venusians into a disciplined army, able to meet the crack mercenaries of the Corp's legion of guards. Before he has completed this task, Torgutkluck is invaded by the main body of guards from Arkgonactl. Brand lures the mercenaries into a trap and wipes out the entire expedition.

Foreseeing the necessity of freeing the other archipelagoes before the Corp can send reinforcements from Earth, Brand browbeats the hesitant Provisional Council into creating a small regular army and navy. Command of the latter is given to Martin Vivian, a shrewd, daring, grizzled adventurer.

While the Council debates, Brand sends aid to the struggling colonists on the archipelagoes of Golubhammon, Martablanging, Janusking and Hikelungeri. All succeed in throwing off the Corp yoke. Confronted by these successes, the Council approves a huge expedition to recapture Arkgonactl, the wealthiest colony and the seat of the Corp's power.

After defeating the Corp fleet on the sea, the expedition anchors off the great hundred-kilometer-wide swamp that encircles Arkgonactl. Reluctant to throw away the lives of his men in a direct attack, Brand instructs the wily Vivian to look for a weak spot in the Corp defences, where the Venusians can break through.

This takes considerable time, and the Venusian militia become restless. They put pressure on the committee of Council delegates that accompanied the expedition, and the latter, playing politics, give them permission to return home. A number of privateers, which make up the bulk of the fleet, also abandon the expedition, despite Brand's protests.

Made desperate by these light-minded defections, Brand allows Vivian to talk him into sending a small force into the swamp to make a surprise attack and open the way for the main body. The attackers are "jumped" by a brigade of Venusian loyalists, who have sided with the Corp, and are wiped out.

A loyalist prisoner then tells Brand that the Congress of the Confederate States, enraged by the revolt, has taken possession of Venus and is sending a

*full corps of regulars to suppress the rebellion and rule the planet as conquered territory.*

BRAND MARTEL leaned on the bridge rail of the *Arkol Taxpayer* and gloomily regarded the distant fringe of green swamp that marked the boundary of his native colony, Arkgonactl, the Jewel of Venus. Behind him, riding easily at anchor on the placid Blue Ocean, lay what was left of the great fleet that had set out so confidently three weeks before to free Venus of the last vestige of its slavery.

"We've still got a few days left, Brand," said Admiral Martin Vivian, standing at his elbow. Vivian's usual fierce cheerfulness was subdued since his pet scheme for crawling through the back door of the fortified, swamp-ringed island had resulted in the total loss of an expedition of more than a thousand men.

"A few days, a hell of a lot to do, and no way of doing it," Brand retorted bitterly. "We can't even launch a general attack now. We haven't enough men left."

"Haven't you notified the Provisional Council of the danger? Lord, don't they realize Earth is sending a full army corps to Arkgonactl? More than sixty thousand men."

"Notified them? Hah! I've been telling them that every time I've been able to get a councilman on the televisor. You know what they say: 'Arkgonactl will have to shift for itself. The other colonies have their own problems.'"

"And what are they going to do when the enemy lands on the shores of their own precious colonies? Yell 'boo' at them?"

"They've got an answer to that, too, Vivian. They pointed out that we've destroyed the Corp's battle fleet, and any invading army will be marooned on Arkgonactl. That fat little slob from Yakishikiki told me

to just be patient and the Earthmen would go away again when they got tired.

"The whole thing is that these colonists hate to pull together, and the delegates they send to the Council are primarily interested in getting themselves re-elected. They've solved the problem for themselves, by leaving me here with a few thousand men from the regular army to besiege Ark. Meanwhile, they're playing politics on Yorgutkluck."

"Yeah," Vivian spat. "Well, I've got an answer to *that*. I've just been sweating some prisoners Dorgan brought in last night, and the C. S. A. is shipping a dozen new-style cruisers from Earth along with the army. They're broken down, of course, but they can be assembled in a week in the Wallacetown shipyards."

Brand whistled. "That's bad."

"How many men do we muster now?"

"Less than five thousand in the army, and that's including the two thousand regulars. Another batch of swamp runners went home last night. Said they wanted to harvest the burlon crop before it was too late."

"Hm-m-m. I've got the five navy ships and half a dozen privateers left. And about twelve hundred men to man them."

"There's only one answer," Brand said suddenly. "For a while I was inclined to agree with the Council and avoid casualties. But I see now that we've got to attack before the fleet from Earth arrives, seize the spaceport and bar it to them. And they can't land anywhere else on Venus. These low clouds preclude any attack from space."

"That's what I've been waiting three weeks to hear," the bearded sailor exulted.

"All right. Get back to your flagship. Your squadron will lead the way—right smack into the swamp. It's watery enough along here so a

ship can force through. I'll bring up the transports."

Orders crackled over the blue water and the somnolent ships leaped into life. With action in prospect, the mercurial Venusians shed their discontent and eagerly took up their arms. The fighting ships moved into the van and the transports fell into line behind them.

"They're bound to have us spotted," Brand told Vivian over the televisor, "but I'm counting on getting under cover in the swamp before they can bring any ray guns to bear."

THE BOWS of the squat, square-ended vessels lifted as their rocket exhausts drove them through the water. Closer and closer came the green wall—then they were through the curtain and long, sinuous branches whipped the hulls and superstructures.

Ahead, Vivian's fighting ships were clearing the way, blasting stumps and too-thick branches with their ray guns. The transports rocketed along in their wake, but slower now. Behind them a fairly clear channel stretched through the primeval bog, roofed over by the interlaced foliage.

"Keep going, Vivian," Brand ordered. "I want to get as deep into the swamp as possible."

For another two hours the ships bored through almost solid vegetation, but frequent glances at the fathometer told Brand they had plenty of water under them—and the biggest of the transports drew no more than two meters. But their progress was slowing perceptibly. Vivian was zig-zagging now, both to avoid rocky islets that appeared more and more frequently and to prevent any following enemy ship from enfiling the unarmed transports along the line of the channel.

"All right, heave to, Vivian," Brand

barked as a cluster of small islands slid past. "We'll base here."

The admiral nodded and swung his ships in a wide circle around the islands, clearing a broad swath through the bog. This would prevent any Corp snipers from slipping up on the camp and would afford room for the transports to maneuver and anchor.

"Well, this is where we are now, roughly five kilometers from the southern edge of Wallacetown," Brand said when the staff officers were assembled in the *Taxpayer's* saloon an hour later. He stabbed a map with his finger.

"We're in an arm of the great swamp that runs deep into Ark-gonactl. In fact, it cuts the island almost in two. To the west of us, five or six kilometers through the swamp, is the Ark spaceport. Beyond that is the harbor, at the head of the main channel, and the shipyards."

"You figure on taking Wallacetown by assault, sir?" asked Green, standing, as always, by his idol's elbow.

"No," Brand said. "I don't. For one thing, we can't spare the men we'd be sure to lose. You can depend on it, General Waters has already shifted his defense troops to the edge of this inlet."

"Then I don't see how we're any better off than we were before," objected a Golub major. "At least, on the ocean we could have cut and run for it if necessary. It looks to me like we're trapped now."

"We are if we just sit here," Brand snapped. "But we're not going to just sit."

"You've got some plan, and I bet it's a good one," Vivian said. "Let's hear it, Brand."

"We've got two main objectives," Brand went on. "One is the spaceport. If we can capture that, and hold it, we can set up ray guns and beat off the space fleet from Earth. With no place to land, they'll be

forced to return to Earth, and Ark will fall.

"The second is the shipyards at the harbor. They must be destroyed. Then, even if the Earth fleet lands, it will be months before they can rebuild the yards and set up their ships, and meanwhile we'll control the seas."

"What about the city?" the major wanted to know.

"To hell with the city. We can't war on our own people, even if they won't help us. Once we've driven off the relief force from Earth, the city will surrender. Waters can't hold on forever with the few troops he's got left."

"Why didn't you think of this before?" the Golub major wanted to know.

Brand snapped him a look that silenced him.

"Sounds good to me," Vivian said finally. "When do we start?"

"By the way," Brand asked, "did you learn from those prisoners when the fleet left Earth?"

"Ten days ago. The morning of the seventh."

The muscles along Brand's jaw twitched nervously. "Hm-m-m," he said. "And Venus is now—"

"I worked it out," interrupted Vivian. "Allowing for the speed of the slowest transport, the whole convoy will be here about sunset tomorrow. Of course, they may have sent a squadron of space fighters ahead."

"That means we start at once," Brand snapped. "Captain Dorgan, you know this part of the swamp as well as your own face. Assemble all the swamp runners we have. Establish vedettes all around us, then fan out through the swamp toward the west. Drive in the enemy vedettes. The main body of troops will follow in lifeboats."

A FEW more orders and the officers returned to their own ships to disem-

bark their men. Dorgan worked swiftly—ten minutes after he dropped over the side of the *Taxpayer* the first detachment of swamp runners faded into the green wall surrounding them. Half an hour later the lifeboats, each filled to capacity, followed the paths hewn through the thick growth by the skirmishers.

"Hope Waters doesn't have the bright idea of jumping our ships," Brand remarked to the now-serious Green. "I left only a skeleton defense force behind."

"I don't think so, sir. If he's expecting an attack, he'll want all available men with him."

Brand stole a side glance at the old regular. There was premonition in the latter's eyes. For a brief moment a cold hand clutched the young general's heart.

The experienced swamp runners, hardened by a lifetime in the treacherous bogs, were moving quickly and silently through the watery jungle, either in boats or by swinging from branch to branch. They were handicapped, though, by the necessity of keeping in contact with the main body.

Long, slender, brightly colored snakes wriggled out of sight overhead, or dropped into the open boats, from which they were hurriedly dumped overboard. Strange, hideous armored heads rose from the stagnant water unexpectedly, and the city-bred soldiers had to be forcibly restrained from opening fire on them. Weird scaly birds flapped through the flotilla on leathery wings, their harsh screeching bringing many a man's heart into his mouth.

"The men are behaving magnificently," Brand remarked, pretending not to notice the metal flasks of fiery Venusian brandy that appeared on all sides. He realized this silent trip through the sinister swamp was a terrifying experience to anyone unaccustomed to it. He could still remember his own first sortie into the

miasmic waste, and he had had the veteran Dorgan by his side.

A sharp *spang* shattered the ominous quiet, followed by a volley, and then another. The steady drumming of sustained gunfire broke out all along the line ahead of them. Brand peered forward intently and saw a runner slipping adroitly through the flotilla in a two-man-power canoe.

"Captain Dorgan says to tell you we've contacted the enemy vedette line," the runner reported to Brand.

"I can tell that from the firing," Brand snapped. "What's happening?"

"We're shooting 'em, of course," the man replied, astonished.

Brand reminded himself that these swamp runners were difficult at times, and managed to restrain his temper.

"Just tell me," he said, "how many of them are there? How long is their line, and how deep?"

"Oh, I reckon they stretch pretty near around the swamp. But there ain't many. They're in little bunches of maybe three or five, fifty meters or so apart."

"Good, that's all I want to know. Tell Captain Dorgan to have details mop up along our flanks—"

"That's what we're doing," the runner said patiently. He was chewing a local stimulating weed and punctuated his remarks by directing a blue stream of juice into the water. Brand repressed a desire to kick the man in the teeth.

"Captain Dorgan's orders are to push ahead and effect a landing on solid ground. We'll be right behind him."

"O. K.," the runner said. "I'll tell him." He disappeared back into the swamp.

"All right, Green," Brand barked. "Get this flotilla moving. Dorgan must be half a kilometer ahead of us."

The order was passed from boat to boat and the rocket exhausts' crescendo increased. Darting over the surface like swollen water bugs, the small craft moved ahead.

The firing was sporadic now, but still ahead of them. Now and then a dead Corp soldier or a Venusian loyalist in gold uniform appeared, slumped over a branch or sprawled on an outcropping of rock. Brand noticed with interest that there were four or five of the latter to every one of the mercenaries. A canoe with two dead swamp runners sprawled in the bottom drifted past, indicating Dorgan's men were not having it all their own way.

WITHOUT warning the leading lifeboats burst out of the swamp and ran high aground on the muddy shore of Arkgonactl. Their crews leaped ashore, formed in a ragged line and advanced, rifles at the carry. Still Dorgan's swamp runners were ahead of them, deploying over a far-flung clearing. The *spang, spang* of the atomic rifles was clearer here in the open.

Brand came up with the second wave. Half a rifle shot away were the backs of the first wave, slogging ahead through the mushy farm land. He hurried forward, accompanied by the faithful Green and half a dozen other staff officers. They passed scores of casualties, some dead, others horribly mangled by the high-velocity slugs. This was war as it was fought on Earth, and it called for plenty of replacements—replacements Brand couldn't furnish.

"I hope we can make the forest yonder," he breathed to Green. "We've got to get under cover, where our boys will be more at home. That's the only advantage we've got."

"Yessir. You're right," Green wheezed as he ran. "This damn open-field fighting is hell. But we can't stop now."

The smell of battle was in the veteran's nostrils, and he was wearing a frightening smile.

But for a few minutes it looked as though they would be stopped. Several battalions of trim Corp mer-



*"Get that ship!" Martell prayed. "If we can stop their landing troops, we win; if we don't—"*

cenaries debouched from the woods ahead and sprinted into close skirmish lines. They dropped to the ground and opened fire, pumping slugs across the field with trained precision. They lacked the sharpshooters' eyes of the Venusian colonists, but then they didn't need them at that range. The volume of fire they poured out made up for it.

Brand, listening to the bullets whine

about his own ears, saw his men crumple by the dozens. Others, emulating the veteran Corp soldiers, flattened themselves on the ground. Venusian officers, most of whom were trained on Earth, quickly set their men to digging in with hands, bayonets, knives, spoons, anything.

"At least, we're holding our own," Green grunted in Grand's ear as they, too, burrowed in the muck.

"You!" Brand barked at an aide. "Wriggle back and tell Colonel Gomez to bring up his artillery. Mortars and all. We've got to get a barrage across before they do, and unless I miss my guess, they're ahead of us."

The aide squished through the mud, cursing the botanical wizard who conceived the idea of planting rice paddies in the Venusian lowlands.

"Recognize this country, Green?" Brand asked.

"I think I do, sir. It looks like part of the Wilkins plantation. There's a grove of Earth orange trees over there, and he's the only one I ever heard of trying to raise them here."

"And he's cleared damn near every bit of his land," Brand swore. "I remember hearing him brag about it once."

"I was thinking of that myself," Green said. "We can't outflank them without being worse off than we are now."

"If only Gomez is ready— Here's that aide now, and an artillery officer with him."

The artilleryman half crawled, half swam through the muck to Brand's side.

"Colonel Gomez has his guns set up at the edge of the field," he gasped. "He's mounted field guns on the boats to clear our own troops and sweep the woods ahead. We expected you'd need him."

A series of *burrupppppps* echoed along the swamp behind them and high-explosive shells, charged to the limit with liquid air and oxygen, whistled over their heads. Far ahead, along the enemy firing line, great fountains of mud, water and debris, speckled with spinning arms and legs, sprang up. The individual geysers quickly merged into an almost solid wall of whirling muck as Gomez's expert gunners increased their rate of fire. Both field guns and mortars were in action now.

"That little guy knows his business," Green grunted.

"Signal him to raise the barrage and roll it through the woods," Brand ordered.

The artilleryman fished a peculiar, oblong object, studded with dials and buttons, from his pocket. He studied it a second, then pressed a series of buttons and spun one of the dials.

"Pocket communication set," he explained to Brand. "We found a case of them on one of the battlewagons you captured. They register on a receiver at battery headquarters."

The spurting wall of debris wavered, then receded toward the distant woods.

"All right," Brand bellowed. "Get your men on their feet. We're going forward."

THE VENUSIANS rose and advanced cheering, despite their sadly diminished ranks. There was almost no resistance. Here and there a diehard mercenary or loyalist continued to fire until a slug from a Venusian rifle silenced him, but the backbone of the enemy resistance was buried in the rapidly filling shell holes.

"At least, we won't have to detail burying parties," Green commented as they passed a huge hole whose sides were already crumbling upon eight or ten mangled forms.

Once in the woods the Venusians took shelter behind stumps, fallen trees, rocks and anything that would conceal them or stop a cupro-nickel slug. By the time the enemy artillery got into action they were so inextricably mixed with the defenders they could ignore its menace. Green pointed this out gleefully to Brand.

"Yes," Brand commented. "But I'm afraid poor Gomez is getting it. Unless he has their location and can silence them first."

"I wouldn't worry about him. He

takes better care of his guns than he does his children."

In the dense, dry woods the opposing forces fought fiercely but in comparative silence. Officers had long since lost control of their commands, and the battle was a conglomeration of man-to-man fights and brief engagements between small groups. But the Venusians were still advancing. The white of shells passing overhead was incessant, but encouraging.

Then they were out of the woods and running across an immense open plain, scarred and burned for its full length and breadth—the Arkgonactl spaceport. The battle was over. The surviving defenders were racing madly to the far end of the field, where the giant frameworks of the launching troughs afforded the only shelter from the whistling bullets.

"We've won!" Brand exulted. "We got here on time! We—*What's that?*"

Every eye turned upward, searching the pastel cloud ceiling. Cheers and cries for aid died away as both attackers and defenders stared spellbound at the scarlet streaks that suddenly striped the fleecy heavens. A steadily increasing roar drummed in the ears of the silent watchers.

"Space fighters from Earth!" Green rasped.

"Maybe we can still keep them from landing." Brand was jerked back into action by sheer necessity. "Lieutenant, contact Colonel Gomez. Tell him I want all his artillery at once. Tell him to set up his guns anywhere—so long as he can reach those damned spaceships. Tell him to throw everything he's got at them. Snap into it."

"Six of 'em," Green said, counting the series of triple exhausts overhead. "They're circling for a landing."

"Waters must be in touch with them," Brand declared. "If they try to land at all, you can bet they'll be ready for action."

"The shipyards!" Green suddenly

exclaimed, catching his commander's arm.

"Hell, yes," Brand groaned. "Green, take as many men as you want and cut your way through the enemy. Never mind fighting them. Just get through to the yards. Take thermite grenades. You know what to do."

"Yes, sir." Green, always the perfect soldier, saluted smartly, his face strangely immobile.

Brand held out his hand. "Good luck, Jack. I'll try to help you get away again."

"Thanks . . . Brand." The old veteran turned and hurried across the field, picking up a command as he went. Brand watched him, gulping helplessly as a lump rose in his throat. Jack Green had been a real friend.

"Colonel Gomez is rushing his guns forward, sir," the artillery lieutenant interrupted. "He can't open fire till he gets clear of the woods."

"How long?"

"Just a few minutes."

Again Brand's eyes turned upward. The telltale exhaust streaks were bent half around the horizon now. "Five minutes at the most," he whispered to himself. "Gomez, for the love of Venus, get a move on."

"We've cleared the field, sir," a major reported. "The defenders have been driven back all along the line. They're falling back on the city."

"Damn little good it'll do if we can't stop those space fighters before they land," Brand told him. "Contact the line officers and tell them to be ready to withdraw if necessary. No sense in cutting ourselves off from escape altogether."

THE SCARLET wakes of the approaching space fighters had completed the turn now and were heading back toward the field. They appeared brighter and plainer—and their advance through the clouds was slowing perceptibly. Moreover, Brand noticed with a start, the fiery bands were now parallel.

"They're coming in abreast," he muttered. "No doubt about it now. Waters has tipped them off and they're ready for action."

The artilleryman nudged Brand's arm and the latter glanced toward the edge of the field. Gomez's sweating gunners were hauling their lean field pieces into line and setting up mortars. Little knots of officers clustered around instruments. The professional little artillerist knew what was expected of him. He caught sight of Brand and crossed to him.

"Too damn bad we haven't the big ray guns from those Corp battle-wagons," he said mournfully. "We could blast these ships out of the sky."

"Think anything of our chances now?"

Gomez shrugged his shoulders—a gesture inherited from his distant Latin Earth ancestors.

"Maybe," he said. "No use trying to pick them off in midair. They'll come in too fast. I'm going to let them land, then hit them with H. E. That way we'll get the best results, with what we have."

"Well, we'll know in a minute. Here they come! Take shelter!"

Brand dropped to the ground and through a tuft of scorched, leathery weeds watched the six golden space cruisers drop out of the clouds. The glittering, round bows of the teardrop-shaped hulls seemed to fill the sky.

He glanced at little Gomez, sprawled beside him. The artillerist had taken the communication set from his subordinate and was in contact with his guns, ranged along the wall of trees to their left. His deep, studious eyes never flickered as he mentally estimated the speed of their targets. Brand squirmed around and noticed that the guns were placed so as to rake the line of spaceships with an oblique, enfiling fire. Gunnery, he realized, was an art with Gomez.

The next few seconds seemed eternities to the impatient young Venusian. He writhed under the involuntary

constraint. But there was nothing to do. The golden, globular bows of the enemy fleet seemed to hang immobile in midair as the cruisers' magnetic brakes, gripping the tremendous mass of the planet, slowly dragged the hurtling ships to a stop.

Great sheets of flame roared from the cruisers' sterns, counteracting the gravitational pull of the planet and checking the fall. Closer and closer to the field came the six ships. Now they were over the edge and settling for a landing. The strip of sky between their bellies and the crest of the forest diminished, then vanished. The ground shook as they drove into the field and skidded for half its length before coming to a stop.

"Now!" Brand shouted.

GOMEZ'S fingers played over the oblong panel in his hand and the entire battery line burst into flame. The men's eardrums quivered under the terrific concussion of the high explosive as the space fleet disappeared behind a curtain of smoke and flying dirt.

Again and again the guns roared. Gomez's unblinking, glowing eyes remained riveted on the targets, which gleamed now and then through the spurting, whirling mélange. For ten full minutes the cannonade continued, answered only occasionally by flashes of light from the cruisers' ray guns.

"It's no good, general," Gomez finally remarked in a heartbroken tone. "We're not even making a dent in those chrome-bronze hulls. That armor was built to withstand anything."

Brand raised himself on his elbows and peered forward. Gomez's remark was not exactly accurate. He could see where strips of the armor plating had been torn from the golden hulls, exposing the interiors of the cruisers. But there were not many such holes, and as the ships were aground, they

could not by any stretch of the imagination be called incapacitated.

"How long can you keep up this bombardment?" he asked.

"Another ten minutes, I'd say," Gomez replied dully. He seemed, Brand thought wildly, about ready to cry. "We were short of ammunition from the start, you know."

"All right," Brand said, with a regret equal to Gomez's. "Keep them pinned down till I get my men out of here."

Aides scurried away across the field, ducking low to avoid searching ray beams from the ships, and in a few minutes Brand saw the Venusian troops circling the field.

"At least, they've learned some discipline," he muttered to himself. "They're withdrawing in good order. We'll still be able to give Earth a fight for their money."

Returning to the woods, Brand took command of his battle-weary but angry army. The Venusians were far from licked, but all had the good sense to see that they were helpless in the present situation.

"We're not through," Brand told them. "We'll meet the enemy again, and trim them to a turn."

Gomez, at a nod from Brand, started withdrawing his guns. He needed no instructions. A full battery was left in position, to continue rapid fire until the main body was safely in the woods. The gunners could then save themselves—if they could. This was war.

Except for a steady grumbling from the men, the long march back to the edge of the swamp and the boats was made in silence. Behind them the guns continued to roar, but their harsh voices were growing weaker. Finally they died away altogether. Brand could not repress a shudder. He ordered a company of hard-bitten swamp runners to fall back and cover, in turn, the retreat of the artillerymen.

Vivian met them at the swamp. One look at Brand's face told him the story. He clapped a friendly arm around the young commander's shoulders.

"What the hell, Brand," he said. "No one can win all the time. It's the last battle that counts, and we haven't come to that yet."

Brand turned and looked back over the trees in the direction of Wallace-town. A heavy pall of black smoke, streaked with orange, hung in the sky. A pall too heavy to have come from the cannonading. Green, dogged, faithful and efficient to the last, had carried out his mission.

THERE was no cheering this time when Brand entered New Buffalo at the head of his troops. People regarded him with anger, or, what was worse, with contempt.

"The other side of the medal," he remarked glumly to Niki Willis, who had gone to the port to meet him.

"Don't take it so hard, Brand," the older man, told him. "We know you did your best. You can't help it if the people had the idea the revolution was won and over with."

"I don't suppose your precious Council has taken the blame for stripping me of troops when I needed them the most." Brand's voice was bitter.

"You didn't expect *that*, did you? But I promise you things will be different from now on. I've been appointed secretary of war in Eihler's cabinet. I pull a lot of weight now and, between you and me, most of the councilmen are scared white."

Despite the Council's command to report to them at once, Brand took time to send his troops to the barracks, to satisfy himself the wounded were being cared for, and to make arrangements for replacements. When he finally appeared in the Council

chamber, he had fought down his bitterness and was hard and cold.

"I don't have to report all the details of our defeat to you," he began. "You should know them by heart by now. But I do want to reassure you that Torgutkluck will not share the fate of Arkgonactl, at least not for another month or so."

"Then all is not lost!" It was the delegate from Yakishikiki again.

"No. Thanks to Captain Jack Green and the men who died with him destroying the Wallacetown shipyards."

"Captain Green's act of heroism will not be forgotten," boomed President Eihler, who was quickly recovering his natural pomposity.

"Maybe not," Brand cut in, "but it will be useless unless we here and now decide how we're going to conduct future hostilities."

"It seems to me, general," purred a delegate from Golubhammon, "that you are a little premature in taking it upon yourself to offer advice to this body. After all, the troops who were defeated on Arkgonactl were under your command."

"In that case," Brand stormed, his cold self-control vanishing in a burst of fury, "here are my shoulder straps. Give them to one of your damned constituents, and see how long you can avoid the disintegration cells."

Angrily he ripped the badges of command from his blouse and flung them onto the council table. Half a dozen flushed councilmen leaped from their seats. Then Niki Willis' big fist crashed onto the table.

"Gentlemen," he roared.

"Yes, yes," President Eihler boomed. "Please, let us have order."

"Brand, you keep your shirt on," Willis barked, his thin, ascetic face equally flushed. "The rest of you gentlemen relax. This is no time for personal recriminations. The fate of our planet—I won't mention our own

skins—depends on us keeping cool now."

THE eighty-odd councilmen, suddenly sobered, sank back in their seats along the sides of the vast council table. Brand took a seat at the foot, next to Willis, who remained standing, his cold blue eyes searching every face.

"Personally," Willis resumed, "I think the less said about the defeat on Arkgonactl the better. Brand Martel, I know, nearly accomplished a miracle. He failed in his main purpose, I admit, but that was not his fault. And he has given us at least a month's respite."

"I think we would do better to use that time in preparation for a resumption of hostilities, rather than in personal recriminations. Brand, have you any suggestions?"

Brand rose slowly to his feet and rested his hands on the edge of the table. Again he had control of himself.

"I admit," he said, "that we lost on Arkgonactl. That's past. Let's forget it. The present situation is this: Earth has succeeded in landing a full army corps on Arkgonactl, at least sixty thousand men. But those men are virtual prisoners on the island until their commander has a fleet strong enough to enable him to move them over water."

"Admiral Vivian, with the five ships of the regular navy and half a dozen volunteer privateers, is blockading Arkgonactl. He will continue to do so until the new Earth fleet is launched."

"And then?" The councilman who posed the question spoke for all.

"By then the battleships we captured a month ago should be repaired and seaworthy. And a reasonable number of privateers should be outfitted to bring Vivian's strength up to that of the enemy."

"I see," President Eihler put in.

"You propose a naval engagement, to maintain our control of the seas."

"Not exactly," Brand said. "That wouldn't solve our whole problem. It would only draw it out. There would still remain the Earth army on Arkgonactl and the space fighters who have Venus blockaded outside the atmosphere."

"And that's something to consider," blurted a delegate from Golubhammon. "Here"—he slapped a pile of papers in front of him—"here are one day's protests from the businessmen of my colony. They can't ship their products. Their workers are idle. They're losing money every day."

"They may as well reconcile themselves to go on losing money, until the revolution is a complete success," Brand told him coldly.

"Just what is your plan, general?" another asked.

"You've heard of the ancient game of chess," Brand continued. "It is a battle of wits. Well, I want to match wits with the Earthly commander, only we'll be using men and ships for pawns. We haven't the brawn. We'll have to use brains."

"And meanwhile the Earthly troops overrun every archipelago on Venus."

"Gentlemen"—Brand was deadly serious now—"if you will give me a free hand, and your co-operation, I promise you not an Earthman will ever set foot in a Venusian colony."

THE MONTH was nearly up when Brand, again wearing his commander-in-chief's shoulder straps, sailed from Kardigan harbor with the army. This time there were no militia. Every one of the ten thousand soldiers in his command was a Venusian regular, and nine out of ten were battle-tested veterans.

Accompanying the convoy were the six rebuilt battlewagons captured from the now-defunct Corp, en route to join Vivian as part of the regular Venusian navy, and fifteen privateers.

The chess game had started.

After a feint at Arkgonactl, which included a skirmish in the swamp south of Wallacetown, Brand withdrew into the center of the Blue Ocean. From spies and scouting cruisers, he kept an eye on the enemy's activity.

When the Earthly fleet, convoying some twoscore transports, appeared off the west coast of Janusking, Brand was ashore, waiting for the landing party. At Hikelungert the same thing happened. And at Yakishikiki.

Northward, always northward, moved the opposing forces. Wherever the Earthly commander turned, there he found the Venusian army waiting for him. At Martablanging he landed a division, then sailed south. The Venusian army was back at Janusking to greet him. He returned and only with great difficulty rescued his Marta force from the desolate archipelago on which it was stranded, cut off from the settled colonies by impassable swamps and from the sea by Vivian's cruisers.

Raids on isolated Venusian seaports by cruiser squadrons proved equally fruitless. In every case the raiders were repulsed by well-manned forts. The best the Earthly commander could do was to seize small uninhabited islands outside the ports and maintain a semblance of blockade. But this required the services of half his available warships.

"Not bad so far," Brand remarked, when the situation was discussed at a council of war, in which the entire Provisional Council participated via television.

"But we're not getting anywhere," protested Brand's pet peeve, the fat delegate from Yakishikiki.

"You're not being disintegrated, either," Brand snapped back at him.

But at Golubhammon the tide turned in Earth's favor. The Earthmen effected a landing, the two armies engaged

in a brief battle and the Venusians fled inland.

Hot on their heels across the cultivated burlon fields came the Earthmen. Again and again the Venusians re-formed their lines, only to fall back after repulsing an attack or two.

"For God's sake, General Martel, put another brigade into the line," Brand's staff pleaded after a particularly bloody encounter.

"Order the men to fall back," Brand snapped. "The second, third and fourth brigades will cross the channel in back of us, and take up positions to cover the retreat of the first brigade."

This maneuver was effected, but there was considerable grumbling during the week's respite that followed, while the Earthly commander was consolidating his position and moving transports up through the swamp that separated him from the Venusians. Brand quickly put a stop to it.

"I'm conducting this campaign," he told them bluntly. "And I'm conducting it my own way. The Provisional Council has given me full authority. Any officer or man who disobeys an order will be shot."

"And bear in mind, while we have the enemy on our tails, they're far away from our homes and our wives and children."

WEEK AFTER WEEK passed and still the Venusians retreated through the vast, sprawling archipelago of Golubhammon, maintaining a constant rearguard action with the pursuing Earthmen. Transports sent by Vivian removed the inhabitants of the towns in their path, except for those veterans who elected to throw in their lot with the army.

Thus matters stood when, just three months after the defeat at Arkonactl, Brand sat on a table in a scantily furnished burlon pickers'

shanty in the wildest section of the archipelago and received a delegation of local business-men from the town of Rakonton.

Brand was leaner than ever and his eyes glowed dully when he spoke. His facial muscles twitched oftener now, and his fingers kept up a continual drumming on the table top. In this he was not unlike the rest of the veterans camped around the shanty, which bore over the lintel the scrawled notation, "Headquarters, Army of Venus." Three months of incessant warfare, three months of continual defeats, rasped on their bare nerves.

"We have, I believe, a legitimate complaint," voiced the chairman of the delegation.

Brand eyed him curiously. Here, he thought, is one man who has never missed a meal. Here is a man who has never been forced to forgo bathing in the vital, life-giving rays of an ultra-violet lamp for weeks on end, while calling on overtaxed muscles for still further efforts. That firm, pink flesh was never tempered by battle in the abysmal swamps. To think that there were still men, and women, too, like that on Venus!

"Do you realize, general," the man went on, "that we are faced with ruin? We haven't been able to ship a load of burlon to Earth since Congress sent those regulars to Venus. Our warehouses are bulging, and we can't pay the pickers."

"It's too bad you went to all that trouble," Brand said.

"What trouble?" asked another of the delegation, pinker even than the first spokesman.

"Filling your warehouses," Brand answered evenly.

"But what else could we do? As I said, we can't get a spaceship through the blockade. Those damned cruisers have been blasting every one of our vessels out of the ether."

"Because," Brand said wearily, "I am going to burn the warehouses."

A chorus of frightened yelps greeted this announcement, punctuated with demands for an explanation. Brand waited until the noise subsided.

"An enemy flotilla is headed this way. They know our position. We could, I suppose, stay here and fight them. But that's not my plan. I'm going to retreat farther into the swamp. And I'm not going to leave a fortune in burlon for the enemy. Is that clear?"

"That may be your plan, general," the spokesman said. "But we think differently. We have about made up our minds to open negotiations with the congressional representatives on Arkgonactl. With this burlon as our ace in the hole, we believe we can come to agreeable terms with them."

"I don't doubt that you could," Brand said. "Agreeable to them, that is. But you won't. That burlon burns before we leave here."

"We'll protest to the Provisional Council."

"Protest and be damned. The Council dumped the responsibility for conducting the war on my shoulders and I'm going to conduct it my way. I've already sent a squad to fire the warehouses. Any interference with them will mean death to the one who interferes. And what's more, I'm going to clean Rakonton of food and supplies."

"But . . . but what will become of us?"

"If there are any *men* in Rakonton, they can join the army and eat. The rest of you can beg your meals from the Earthmen. I've arranged to evacuate the women and children. There are transports waiting to take them to Torgutkluck."

"You've already nearly depopulated Golubhammon," howled a fat food merchant. "Why, there are hardly enough persons left in Rakonton even

to justify my keeping my store open."

"Exactly," Brand said. "Well, that'll be all, gentlemen."

TWO grinning guards escorted the delegation outside, where their injured outcries afforded considerable amusement to the soldiers. Having already lost everything but their lives, and knowing that they might lose them any minute, they were in a position to appreciate the grim humor of the merchants' predicament.

"You're not very popular around here, general," commented an unshaven major whose tattered uniform alone served as campaign ribbons.

"I never expected to be," Brand responded. "But let's get down to business. What's the latest information on the enemy's disposition?"

"The flotilla you mentioned is standing off and on down the coast. Apparently waiting for orders—or information. Five fast cruisers, new type."

"No transports with them?"

"None, sir."

"Hm-m-m," Brand said. "Must be just a scouting force. Well, go on."

"The main Earth army, comprising four full divisions of regulars, and a mixed division of Corp troops and Arkol loyalists, is on transports anchored in the Bay of Hammon. Field Marshal John Gumpertz has direct command of them. I believe the Corp artillery is attached to this force."

"The convoy is guarded by three squadrons of cruisers, all new types shipped from Earth. They haven't any battleships."

"Those are the boys we'll have to deal with," Brand said. "In a way, it's a break Gumpertz has them concentrated. That'll keep them out of mischief elsewhere."

"Gumpertz left his fifth division to hold Arkgonactl."

"Yes, I know. He isn't taking any more chances of a surprise attack on his base. Well, that doesn't handicap us any right now. How are things going on the water?"

"Admiral Vivian said he'd report to you at six o'clock. It's almost time now."

Brand glanced at a clock on the wall, then switched on a portable television report screen set up in a corner. A few minutes passed, then Vivian's grizzled face, the black beard beginning to show streaks of gray, appeared.

"Hello, Brand," the indomitable old warrior saluted. "How's tricks with you?"

"We're going along in our own quaint way." The older man's gruff familiarity never failed to bring a smile to the harassed young general's lips.

"Well," the admiral went on, "I'm still carrying out your orders. Two of the battleships sank a transport and a cruiser escort this morning off Yakishikiki. The rest of the fleet is scattered all over the Blue Ocean. We're keeping Gumpertz's ship captains on the jump. They haven't even had time to think of raiding any of the main islands."

"Good," Brand said. "They're still blocking the principal ports, though?"

"Yeah. I don't see why you make me let them. Hell, we could blow them right off that itty-bitsy island they've captured outside Kardigan port in a few minutes."

"No, don't do anything like that, Vivian," Brand said. "You base on the army here. Let them go on thinking this is the only base you've got."

"I don't get it," the admiral growled.

"You will. And soon, I hope. In the meantime, keep on pestering enemy

convoys. But keep your ships within concentration distance."

"You mean we're going into real action?"

"I hope. Good-by. Keep in touch with me. I'm drawing back farther into the archipelago here."

Brand turned to his acting chief of staff, a keen-eyed young general named Crump, who was doing his best to fill Jack Green's shoes.

"Have the men prepare to march," he ordered. "Pick up the supply trams as we pass through Rakonton. We'll use the rail line as long as possible. And don't forget to destroy it after us."

Crump saluted and went outside. Brand turned to one of the ever-present maps and ran his forefinger over the northern section of the Golubhammon archipelago.

"Ideal," he said softly to himself. "If Gumpertz only sees it the way I hope he will."

THE tramp, tramp of thousands of feet took him to the door and he watched his army file past. There were some eight thousand of them, nearly all riflemen and all veterans. The scholarly Gomez, looking out of place in that rough army, trudged past at the head of his artillery, a conglomeration of field guns and mortars of all ages, sizes and descriptions. Brand never ceased to wonder where and how that incredible old artilleryist found his weapons. He always seemed to have full batteries on hand, despite heavy losses and overuse.

But the young commander's principal attention was taken by his newly formed cavalry regiment. Some six hundred of the toughest fighters in the army had been mounted on half-broken teufels—great, grotesque, web-footed, wingless birds discovered on Golubhammon and aptly named by an early Teutonic explorer.

It was a hobby with the Golubs

to capture these frightful swamp birds soon after they broke from their eggs and break them as mounts. They could run better than sixty kilometers an hour on their sprinting, flopping feet, which also served to propel them swiftly through the swamp waters and support them on muck.

Brand smiled as the troopers struggled to force the evil-tempered birds into some semblance of marching order. He knew plenty of curses were being showered on his head for conceiving the idea of such outré cavalry, but he foresaw a use for the force.

Leaving the headquarters orderlies to break camp, he strode ahead to the advance guard. A few minutes later they entered the small city of Rakonton, northernmost of the colonies. The place seemed deserted. Houses and stores were empty. Along the artificial channel huge warehouses burned and belched heavy smoke skyward. Brand nodded approvingly at this. There was more than destruction in his mind. That smoke was a beckoning finger to Gumpertz. He knew the Earthly commander was being lashed by Congress because the wealth of Venus was trickling so slowly back to Earth. And he knew Gumpertz had counted on seizing the year's crop of Golubhammon burlon to satisfy his superiors.

Through the town and into the swamp again pushed the long column. Causeways had been constructed along here to carry the monorail tracks, and the troops followed this route. They would have enough plain swamp travel before they were through.

Except for the grunting of the laden soldiers and an occasional barked order, the first five kilometers were covered in silence. The causeway ended suddenly on a small, flat island, the jumping-off place into the swamp. The advance guard debouched onto the island, dropped their packs and squatted on the ground to rest.

Then all hell broke loose. From every side scaly, flat-snouted heads broke through the scum-covered water. Snake-like arms churned the surface into a green froth and the light glittered on the metal barrels of hundreds of heavy carbines. Ringing reports sounded, and the Venusians, caught off guard, began to fall.

Brand's hat was whipped from his head by a bullet as he plunged forward.

"Take cover," he bellowed. "Behind your packs! Form firing lines!"

Instinctively the veterans obeyed. Wriggling into position, they returned the fire of the Krokols. Heads began to disappear, torn to pulp by the high-powered slugs. But the aborigines, with a saurian's disregard for death, continued to advance on the island.

"Rapid fire!" Brand barked.

"Tain't much use, general," gasped a bearded rifleman at Brand's elbow. "Them damn Krokols duck under the surface and then pop up right in front of you. Where in hell'd they get so many guns?"

Brand knew the answer to that, and it turned his stomach. It was something he never dreamed even a ruthless commander like Gumpertz would sink to. To furnish arms to the fiendish Krokols. Even with their own primitive weapons, they had held the Venusian colonists at bay for more than two hundred years. In his mind's eye, Brand could see the hundreds of isolated communities and farms falling prey to the vicious saurians. The same thought, he knew, was running through the minds of the other men.

HE LOOKED back along the causeway. It was covered with still, mangled forms, some wearing the green uniform of the army, but more clothed only in glistening scales. Farther back, Venusians lined both sides

and kept up a steady fire on the swamp. A brighter glint of metal flashed behind them.

"Some of Gomez's mortars," flashed through Brand's mind. "But what does he expect to do with them?"

He was answered almost immediately. A series of shells rose into the air and burst deep in the murky water along the nickel framework of the causeway. Green bodies, some limp, more burst open, appeared on the surface. Another volley dropped into the scum-covered water, and still more bodies floated to the surface. The firing died away.

"I get it!" Brand exclaimed. "The concussion is killing them. Like the stories of dynamiting fish on Earth I used to read. Leave it to Gomez to think of something like that. He'd find a use for artillery in church."

The menace removed, reserve troops dashed along the causeway and added their fire to that of the small group on the island. The crocodilian heads vanished together, but this time they reappeared farther out. The Krokols were retreating as fast as they could swim.

"That's funny!" a rifleman exclaimed. "They're heading right for the open sea. You can see it through that break in the trees yonder."

Brand looked. The man was right. The Krokols were swimming toward open water, to certain death in the rapacious jaws of the monsters of the deep.

Then the five Earth cruisers that had been hovering off the coast drifted into view between the trees and supplied an answer.

The glistening green heads of the fleeing Krokols were plain on the flat blue water. They were swimming straight for the cruisers. Some of the men continued to fire, taking careful aim and scoring hit after hit. They, like the others, were thin-lipped with cold rage. Their faces boded ill for the enemy when

and if the latter ever came within range.

In his vindictive determination to crush the rebellion, Marshal Gumpertz had committed the one unforgivable crime on Venus. He had armed the savage Krokols and turned them loose on the helpless inhabitants—for the saurians were too wary to battle armed men if they had a choice.

"Venus won't forget this," Brand gritted between his teeth. "The whole planet will be in arms now. The damned, money-grubbing politicians in Congress have finally overstepped themselves. If only it isn't too late! But it can't be."

The army was reforming. Soldiers carried the bodies of their fallen comrades to the center of the little island and laid them in a pile, interspersed with thermite bombs. The dead Krokols were flung to the greedy, scavenging denizens of the swamp, already feasting in the bloodied waters. When the tail of the column jumped off into the swamp, the rear guard touched off the thermite and the bodies disappeared in the clean, white heat. It was a better funeral, perhaps, than they would get themselves.

NORTHWARD, always northward, Brand led the warriors of Venus. Still the vast, mysterious swamp lay ahead of them, as it lay now behind them, and on either hand. Even the staff officers could see no reason in this forced and laborious and always dangerous march. But Brand quieted them with a scowl.

Now and then a runner caught up with the column, reported to Brand and disappeared again in the swamp. Every hour a television screen was set up by the engineers and Brand talked to Vivian, to Niki Willis, to other commanders scattered over the face of the planet. Once he held a long private conversation with the worried Provisional Council.

Finally, summoning his staff officers and the battalion commanders, Brand unrolled a new but crude map.

"This is our present position," he pointed out, stabbing a circled kidney-shaped blot of land in the green representation of the swamp. "We're way up in the north of the archipelago. But, what's more important, Gumpertz and his whole army are right on our tails. They followed the coast, then worked through this channel here. We crossed it yesterday."

"Will you please tell us, general, what in hell is the big idea?" snapped a wearied colonel. "My men have marched their legs off, and we've had casualties every day in this damned wilderness."

"The idea," Brand snapped back, "is to draw Gumpertz away from his base on Arkgonactl. To draw him up here in the swamp, where he'll be handicapped by his sheer numbers, and where one of our men will be worth a squad of his Earth soldiers."

"What if he figures that out, too, and goes back? And leaves us marooned up here?"

"He probably has figured it out by now, but he can't do anything about it but fight. He can't do anything on Venus while we have a strong, well-equipped veteran fighting force, and command of the seas. And we have that."

"No, gentlemen. Marshal Gumpertz has got to fight, and now. He'll never again catch us in a position like this, where we have to fight, too. And he knows it. He's got the greater army, and a fair number of cruisers. But his only hope is to destroy us on land and bar the navy from its bases until it scatters or surrenders."

"But, good Lord, general, you're gambling the fate of Venus on a single battle. And on a battle where we're outnumbered seven to one." The colonel was aghast.

"I know it," Brand told them. "I

know it as well, if not better, than you do. But it's our only chance. Already many of the Venusians, those with businesses and property, are tired of the war. We can't carry on without their support. And it's next to impossible to get the militia to fight off their own archipelagoes. After seeing those Krokols I don't blame them. They've got homes and wives and children to protect."

"If we have to fight this way, well, we'll do it," a battalion commander put in. "But I tell you, general, it's against reason."

"Are you going to attack, or let Gumpertz make the first move?" the colonel asked.

"I want him to attack," Brand said. "But we may have to prod him a little. We're going on to the east end of this island. It's big enough in back of us to let us maneuver, and narrow enough in front of us to keep Gumpertz from outflanking us. He'll never maneuver those Earth soldiers in the swamp."

"No, but he's got Krokols."

"I'm not forgetting them. I hope he uses them. The more of those reptiles the boys kill now, the fewer we'll have to exterminate later."

"One other question." It was the major again. "Is there any chance of our getting reinforcements?"

"Yes. Admiral Vivian has instructions to pick the garrisons of Torgutkluck, Yakishikiki and Martablanging, and as many veteran militiamen as will volunteer. He should bring us several thousand men."

"Now move your men to the other end of the island and dig in. The channel ends some distance away, so you'll be out of range of the cruisers' ray guns."

AS BRAND had said, the island, which he chose from a little-known survey map made only the year before, was ideal from the viewpoint

of a small defending force. It was irregular in contour, with rolling hills, densely wooded. The swamp, however, encroached on all sides, thus effectively screening an attack. But the Venusian outposts would take care of that.

To the east were a number of smaller islands, which Gumpertz had undoubtedly already seized. But they were separated from the main island by from a half to five kilometers of swamp.

The sound of firing marked the arrival of the first contingent at the end of the island. Brand and his staff hurried forward on squawking teufels borrowed from the cavalry. The Venusians were stretched across the comparatively narrow stretch of land in a ragged skirmish line, and were firing steadily as they advanced from tree to stone, and from stone to brush.

Scattered over the rolling slope were glistening green bodies, interspersed with blue-clad figures. None moved.

"Good," Brand said. "This will tell Gumpertz we're here. It's his move now."

He nodded to the colonel of the cavalry and the mounted men dashed forward on their ungainly, two-legged steeds, howling fiercely and swinging six-foot razor-sharp blades. The mere sight of them was enough for the Krokol irregulars, who broke and waddled hastily toward the shelter of the swamp. The regulars, although startled by this terrible cavalry, rallied and stood their ground.

But neither profited. The cavalry rode over the khaki line and cut down the fleeing Krokols as they ran. The long blades bent and whined in the air as the Venusians chopped right and left. Those who escaped the steel were beheaded by the snapping twenty-inch bills of the fierce war birds. In a few minutes the slope was clear.

"We'll dig in along this ridge,"

Brand told his senior engineer. "That way Gumpertz' will have to attack up the slope, and that's half a kilometer if it's a hand-breadth."

"If he doesn't outflank us, after all. We'll be in the soup then." It was the suspicious colonel again.

"You don't know this particular swamp, colonel," Brand said with a smile. "Come with me a minute."

They picked their way down the slope at the end of the ridge and came to the tall rushes that marked the edge of the swamp.

"Smell anything, colonel?" Brand asked.

The other sniffed several times. "Tar," he said.

"That's right. Now look." Brand pushed aside the rushes and disclosed a shiny, ebony pool. Other pools reflected the filtered light beyond the swamp trees.

"These pits are almost bottomless," Brand said. "They stretch for miles on either side of the island. I only learned about them myself the other day. I doubt if Gumpertz's men have discovered them yet. But one thing is certain: no big body of troops is going to encircle us. An insect couldn't cross one of those pools without being sucked down."

"Gumpertz might still pull out when he finds what he's up against."

THE WORK of fortification continued. Along the ridge the engineers dug a deep trench, complete with embrasures for the riflemen. Behind them Gomez happily superintended the construction of gun emplacements.

Other engineers were busy erecting tall masts along both sides of the island up to the trench, and stretching cables from them back to the interior.

"All ready, sir," the senior engineer reported to Brand just before sunset. "The atomic converters and

generators are running smoothly. We've got enough current to stop a spaceship."

Brand summoned Gomez and gave him some instructions. The latter was patently puzzled, but had served through too many campaigns with the young general to question him.

He collected a mortar crew and moved the weapon down the slope away from the trench. Brand waved and the mortar belched forth a heavy shell which curved through the air and fell straight toward the trench.

Soldiers, attracted by this curious maneuver, instantly hurled themselves to the ground and sought to merge their bodies with the earth. But the shell never reached the trench. A hundred meters above the ground, at the level of the top of the masts, it exploded with a mighty blast.

Brand and the senior engineer looked pleased. Other officers, puzzled, scratched their heads. Gomez, equally bewildered, returned and looked inquiringly at Brand.

"It's an electric screen," the latter explained. "Holbrook here was working on the principle in the university when the revolution started. There's an impenetrable screen stretched across our position from the tops of those masts. No shell can go through it."

"Why," Gomez gasped, "that'll make artillery absolutely useless in the future."

"Just so it makes Gumpertz's useless right now is all I ask," Brand retorted. He walked away, leaving Gomez staring despairingly at the tops of the masts.

Glancing over his shoulder five minutes later, he saw the veteran artillery man hadn't changed his posture by the flicker of a muscle. The same dazed expression was on his face.

"Poor Gomez," Brand thought. "He's either contemplating suicide or trying to figure out a shell that will go through Holbrook's contraption. He

must be in love with those damned noisy guns of his. No wonder his wife left him."

He glanced at his watch and switched on the televisior at the makeshift headquarters. In a few minutes he was talking to Vivian.

"Well, I carried out your orders, Brand," the other said. "I'm a hundred kilometers off the coast of the swamp, right opposite the entrance to the channel Gumpertz used. I've got six transports loaded to the gunwales with troops. How am I going to get them to you?"

"Never mind that now. How are things on the other archipelagoes?"

"The same. The inhabitants are afraid to try to leave and the enemy detachments guarding the ports aren't strong enough to attack them."

"Good. That means the war will be settled here."

"Yeah. It's a break for the non-combatants. You ought to get a medal for that, Brand."

"Never mind that. Here's what I want you to do. Run down and destroy any stray Earth cruisers along this coast. And bottle up the mouth of the channel. It'll be easy. There isn't room for the Earth fleet to maneuver. They'd have to come at you one at a time."

"I know the set-up. I'm beginning to get your idea, Brand. Hell's bells, but you've got a brain in your head. I don't have to ask if you're holding up your end."

"Don't yet," Brand said. But he was pleased.

FOR TWO DAYS Gumpertz lay in the swamp. The only action that took place was an occasional exchange of shots between roving skirmishers. Here Brand's swamp runners were at their peak. They could sneak almost aboard the enemy transports without being seen, fire half a dozen shots and disappear.

"Keep that up," Brand told their

commander. "It'll help destroy the enemy morale and will force Gumpertz's hand."

"It's not as easy, though, as we thought it would be," the other said. "That rat Gumpertz has pretty near ten thousand Krokols with him. Most of the time my men are ducking or fighting them."

The Krokols proved troublesome in another way. Gumpertz, although he had allowed himself to be tricked into entering a trap, was not an absolute fool. He obviously did not intend to make a frontal attack until all other methods failed, and he was indefatigable in his efforts to turn Brand's flank.

The tar pits, as Brand foresaw, barred any major troop movement, but there were a few open passages through them, and through these came hundreds of crawling, swimming Krokols. Brand, touring back of the lines, experienced some of this strategy. He was discussing the advisability of a communications trench with Holbrook when, without warning, half a hundred Krokols appeared along the shore.

The Venusians working there dropped their tools, caught up their rifles and opened fire. But the Krokols, having the advantage of surprise, swept them back. As soon as the shore was clear, a dozen power canoes grounded and from them poured a full platoon of Earthly infantry.

"Good God!" Brand exclaimed. "Holbrook, call headquarters for reinforcements."

He himself plunged into the thick of the fray and rallied the Venusians. The latter were outnumbered, but being stubborn fighters, they took shelter and refused to give ground further. They were barely holding their own, however, when a squadron of cavalry swooped down the hill and routed the invaders.

"Anyway, I've learned something," Brand remarked to Crump a little later. "This teufel cavalry is ideal

for guarding the shores. The six hundred of them can do more than a couple of thousand infantrymen. And you can bet that when Gumpertz attacks, his Krokols will be buzzing along very inch of the shore."

"I'll assign them to that duty, then, sir."

"Better assign a battalion of riflemen to operate with them. If the Krokols do succeed in landing some place in force, the infantry can take care of them and leave the cavalry free for patrol duty."

Brand had counted on at least a week to prepare for the impending attack, figuring that Gumpertz would take that long to sound out their relative positions. But the veteran marshal was an experienced man. He sized up the situation at once, undoubtedly cursed himself for being thus outmaneuvered, and immediately launched an offensive.

The attack started just before dawn. Brand's vedette posts vanished in the flood of armed men, but not before they had warned the main body. The necessity of moving thousands of men through the swamp in small boats handicapped Gumpertz, but the impenetrable vegetation protected him from the Venusians' fire.

"Let me throw just a few mortar shells into that swamp," Gomez, tagging after the ubiquitous commander, begged.

"Not now," Brand said. "You'd only be wasting ammunition, and besides I *want* Gumpertz to move his men up here, where I can get at them."

He did, however, send a line of skirmishers into the swamp to engage the vanguard of the attackers. He was faced with a delicate problem. Everything depended on his drawing Gumpertz into battle while conditions favored the Venusians, and to do this he had to let the Earthly commander have the advantage of odds. But Gumpertz might grow too suspicious and merely stand pat, in

which case both would be stalemated and the revolution would die of inertia. On the other hand—but he refused to entertain that possibility.

THE JINGLE of equipment and now and then a muttered curse came from the trenches as the Venusians moved into position. Excellent shots all, this, to them, would be like small boys peppering a bronto with bean shooters. But—always that but—there were *so many* of the enemy.

"The ancient English did it at Agincourt, the Americans did it at New Orleans and the Germans and Turks did it at the Dardanelles," Brand told himself, in an effort to draw encouragement from history. "And with aircraft eliminated, we're in the same position."

"Well, sir, this will be the test of your theory," Crump remarked to him. "I confess, after we were chased off Arkgonactl, I thought we were through. And letting the Earthlings lick us in every little engagement the past three months, well, I must admit, sir, I began to have my doubts."

"Of me?"

"That's it. But now I can see what you were aiming at."

Brand felt unaccountably relieved. He *had* been worried, all those months he was encouraging Gumpertz to chase him into the swamps. Anything might have gone wrong, and the responsibility was his alone. But, looking back, he couldn't think of any other strategy that would have accomplished his purpose so quickly.

There was little time left for reflection. Already the skirmishers were emerging from the swamp and racing up the slope. Behind them appeared a line of blue, standing out darkly against the pale-green foliage. The sky in the east was faintly pink.

"Be light enough for good shooting pretty soon," remarked a rifleman,

squinting over his sights. "Bet I could knock off a couple of those blue uniforms right now."

"No shooting till I give the order," Brand barked. "Pass that along."

Faint *spangs* sounded in the stillness in back of them.

"Harrington's cavalry seems to be in it already," Crump said.

"I expected that," Brand told him. "Naturally Gumpertz would open his diversion first. But our cavalry has spiked that maneuver, whether he knows it or not."

The blue line at the base of the hill thickened as the light grew stronger. The watchers, half a kilometer up the slope, could see streams of men breaking through the rush border of the swamp.

"He's emptying his boats and sending them back for more," Brand decided. "It'll be an attack in force all right."

"We're ready," Crump said confidently.

"Too bad we haven't got Vivian and Dorgan and their men with us. But they're playing their part at the other end of the channel."

Crump looked up expectantly, but Brand did not bother to explain further.

THE WAITING Venusians, never overly patient, were making remarks and cracking bad jokes all up and down the line. Brand went down the trench, slapping a back here, putting in an encouraging word there. It was easier than it had been at Granagon. Half a year of steady warfare had impressed the veterans with the need for discipline and order.

"We can expect a bombardment," Brand told his captains, "but we needn't worry about it. Holbrook's screen will stop any mortar shells, and we're dug in enough so their field guns can't reach us.

"Gumpertz will probably move his

first two or three waves up within a hundred meters of us by squad rushes. I want only every fifth man to fire at them. No sense betraying our strength at the outset. When the main attack comes, have half your men fire at the attackers in front of them. The rest concentrate on the reserves farther down the hill.

"Remember, our only chance of winning—and this battle means the whole revolution—is to inflict as many casualties as possible. That's why I'm letting the enemy gang up out there."

All saw the import behind this reasoning. The Venusians were shrewd as well as brave. They had to be to live on the savage planet. But it was becoming increasingly difficult to restrain the men. In no age or country have soldiers enjoyed waiting while the enemy went about the business of preparing to exterminate them.

But Gumpertz could not afford to delay long, or he would sacrifice the only advantage he had—that of poor light which would minimize the accuracy of the Venusian fire. Half an hour after the first troops landed, three waves started up the hill.

"Remember," Brand cautioned. "Let them come within a hundred meters. Those waves aren't strong enough to take us, and there will be other targets behind them."

Men shifted nervously from one foot to the other and knuckles grew white against the dull beryllium barrels. The steady advantage of the Earthly infantry never faltered. They were still walking with long, loping strides, their bayoneted carbines at the carry. Crack troops, those.

"Saving their strength for the final rush," Crump commented, eying the line. "Damn little good it'll do them. Those boys are doomed, and they know it."

"Sure," Brand said. "But automats don't think too much."

Other waves formed and crawled up the hill, one after the other, until the lower half of the slope was covered with blue-uniformed figures, hazy in the pinkish light.

"Now!" Brand shouted as the first wave broke into a run. "Give them hell, boys! Fire at will, but aim! Aim!"

Rifles clanged the full length of the trench. The ringing reports were deafening, and Brand had to look twice before he was satisfied only a fifth of the men were firing. He looked back over the parapet. A full half of the first three waves were sprawled on the ground—and the survivors hadn't covered twenty of the hundred meters that separated them from the trench. Even as he watched, they, too, pitched forward, twitched once or twice, and were still.

Wave after wave charged up the slope, and went down under that terrible, accurate fire. Then the blue-uniformed men halted, wavered a moment, and turned and ran. Whistles sounded behind the parapet and the firing died away.

"Well, that's that," Brand said. He glanced at his watch. Barely three minutes had passed since his men opened fire.

"They seem to be digging in down there," Crump pointed out.

Brand looked. Little clods of earth were popping into the air at the foot of the hill, falling back to form a rapidly growing embankment.

"They should have thought of that first," he commented. "However, we needn't worry about it. This won't degenerate into long-drawn-out trench warfare."

THE VENUSIANS were laughing now and cheering each other. Brand smiled grimly. Let them cheer, he thought. There's plenty ahead of them. That first attack was only a tentative feeling out of their line. Gumpertz hadn't even started his

offensive. Again Brand mentally congratulated himself on cutting his fire power to twenty per cent.

A succession of explosions overhead turned all eyes upward. The air was fleecy with smoke and punctuated with orange explosions. Metal fragments rained down on the trench and the reverse slope behind them. Several men collapsed as the heavy fragments struck them.

"Damnation!" Brand swore. "I should have thought of that. Here, start those men digging dugouts. Shallow ones will do. Just get them under some cover."

He himself remained in the open, supervising the work, until his collarbone snapped as a big chunk of iron glanced off his shoulder. Crump dragged him into an improvised shelter.

"This would have to happen now," Brand gritted. "Just strap it in place. I haven't time to nurse it."

Other shells *whooshed* harmlessly overhead and the bombardment was intensified. The Earthly gunners, perplexed at first, had quickly caught on to the principle of the screen and were throwing solid shells from their mortars. These dropped with monotonous regularity into the trench, drawing curses from everyone but Gomez. He was smiling for the first time in two days.

"One thing is certain," Brand said. "They can't keep that up forever. Gomez, why in hell aren't you replying to their fire?"

The little artilleryman pointed to the screen masts.

"They can't drop H. E. through that," he pointed out, "and I can't push it through from underneath. The thing works both ways. And it would be suicide to try to bring field guns where they would bear in the face of this barrage."

"Well, use solid shot in your mortars."

"Haven't any." Gomez sighed. "Who'd think anything like this would

happen? Nobody ever tells me anything."

The barrage continued for an hour, then suddenly ceased.

"Come on!" Brand shouted. "Get your men up on the firing steps!"

Cheered by the opportunity to get in another lick at the enemy, the Venusians leaped to their posts. The blue waves were coming up the slope again, but this time they were closer together and nearer the top, having advanced under the curtain of their barrage.

"All guns!" Brand ordered. "Rapid fire! This is the real thing."

Again the murderous hammering broke out along the trench. At that close range every shot told. Wave after wave vanished—but still they came on. At a quick estimate, Brand put the number of shock troops on the slope at more than ten thousand. A full division.

But the casualties they were suffering were too heavy to bear. Whole companies went down at a single volley. The green carpet of the slope was covered with twisted blue figures. Along a line a hundred meters from the trench the dead were piled four and five deep.

Brand was the first to see the danger in this. The Venusians' unbearably murderous fire was bringing its own reaction. Earthmen, unable to approach that deadly firing line, were taking shelter behind the bodies of their fallen comrades. The pile of dead became an enemy parapet, heavily manned and too close for comfort. The Earthmen had opened fire themselves now, and Venusians, exposing themselves recklessly, were falling by the score.

A TALL periscope, hastily rigged by the engineers, gave Brand a quick view of the field before it was shattered by an Earth bullet. That one glance was enough. Gumpertz, seizing the immediate advantage of the situation,

was moving two more divisions up the slope. The men were massed in an almost solid body. Their sheer weight threatened to roll the Venusian defenses flat.

"Gomez," Brand roared. "Get your mortars into action. Shell hell out of that field! Quick! Holbrook, switch off that damned screen so our own artillery can operate."

Cursing himself for not thinking of this before, the eager little artilleryman sprinted back to his battery line, behind the crest of the hill. The gunners were only too anxious for action, and it was only a matter of seconds before they were raining high explosives on the massed troops.

Another periscope showed Brand the ghastly havoc the shells were wreaking. Ten squads at a time were blown to bits. The Earthmen had no shelter. Massed as they were, they could not even flatten themselves on the ground. It was too much for Brand. He hastily looked away, feeling sick at his stomach.

But there was little time for thought. Human nature, even when nearly obliterated by the rigid Earthly army training, could not long stand such carnage. On their own volition the Earthly infantrymen were flinging themselves on the Venusian position, charging madly into that deadly fire to escape the even worse destruction behind them.

Desperately, frantically the Venusians mowed them down. They did not have to be told that they would be overwhelmed by that human flood if they relaxed even for an instant. As it was, a small but growing number of Earthmen were succeeding in reaching and jumping into the trench, where they were instantly pistoled by the Venusian officers. But the red rage of battle inspired others to take their places.

On either wing of the slope, however, men were abandoning the fight and leaping into the swamps, pre-

ferring the unknown terrors of those miasmic stretches and the traps of the tar pits to the certain death that awaited them on the island. But for those in the center there was no choice. They died.

"It takes a long time, a terribly long time, to kill forty thousand men," was the thought that ran continually through Brand's head. Fortunately for him, and the rest of the Venusians, their actions needed to be only automatic. Had they been forced to think consciously of what they were doing, their minds would have snapped. Brand realized that long afterward.

The minutes dragged on, each an eternity. Finally the firing died away. There simply wasn't an Earthman left alive to shoot at. Brand forced himself to look again. The fine, green grass that had carpeted the slope was completely invisible. The torn, mangled corpses of the three divisions formed a solid blue floor from the trench at the crest of the hill to the swamp at the foot.

The silence was stifling. Brand stumbled back out of the trench and was sick. When he looked up again, he saw he was not alone. Every man in that Venusian force was mentally scarred for life. There were no cheers, no laughter. Only mute, awed faces. They still scarcely realized the slaughter they had committed, but the awful, unconscious awareness of it, Brand knew then, would be with them for life.

It was impossible to keep the men in the trench any longer, and Brand did not care to try. They crawled wearily over the crest and collapsed from sheer exhaustion. Brand forced himself to go to his headquarters shack. The war was still on, and he was the commander in chief.

A FEW QUICK drinks of the fiery Venusian brandy brought him to and he switched on the televisior to com-

municate with Vivian. The latter was patently eager for news of the battle, the sound of which had carried over the forty miles of swamp to the besieging fleet.

"Gumpertz gambled and lost," Brand told him. "We wiped out three full divisions, to the last man, and God only knows how many were killed in the swamp skirmishes. I haven't gotten all the reports myself."

"Three of their cruisers tried to break through," the sailor said. "We blasted two out of the water. The other one escaped back up the channel."

"Stay there for the time being. I'll call you back. I don't think there'll be any more fighting on Venus."

Harrington entered the shack, grinning. His fighting, Brand thought, must have been human, at least.

"The cavalry has been at the gallop—if you can call it that—since before dawn," he said. "The Earthmen and Krokols tried to sneak ashore all along the line. I still don't see how they got so many men through the tar pits. They must have been moving them up for two days."

"I take it you were successful."

"And how! The shore is lined with bodies. A couple of thousand of them. Mostly Krokols. The boys enjoyed killing them."

"For God's sake, don't talk to me of killing," Brand begged. "I'm sick now. Go take a look at that hill yonder."

"We took quite a few prisoners," Harrington went on. "They told us Gumpertz has been having trouble with his loyalist division. They mutinied when they learned he was arming the Krokols—the Corp soldiers, too. They've been on Venus long enough to realize what it meant."

"Harrington," Brand said suddenly, "I'm going to call Gumpertz. He's washed up, through. He'll listen to any terms. He has to, now."

Brand turned to the televisor and twisted the frequency dial. It took him several minutes to find the wave length the Earth forces were using, and several more to attract the attention of their headquarters. Finally a handsome but sullen face appeared in the screen. Brand noted the man was wearing the shoulder straps of a staff captain.

"This is General Brand Martel, commanding the Venusian army," he told the Earth captain. "Call Marshal Gumpertz to the televisor."

"Very well," the other scowled. "The marshal is right here."

Gumpertz's heavy, red face appeared in the screen. His mouth drooped despite his obvious effort to control himself. His eyes were bloodshot and he had some difficulty in speaking.

"Yes," he said finally. "I can guess what you're going to say, general. Go ahead."

"There has been enough bloodshed," Brand said. "It would be not only foolish but criminal to continue fighting. I know your position. You're stuck out there in the swamp. Half your command is mutinying. You know now you can't break through our defenses even if you could get your men to attack again. Your fleet is useless. Admiral Vivian has the mouth of the channel blocked."

"Go on," Gumpertz said quietly. "I acknowledge all that. What terms do you offer?"

"I'm not going to be harsh," Brand said. "Vindictiveness is not a Venusian trait. All we on Venus want, all we ever wanted, is freedom from Earth. Independence."

"I want you to surrender your forces, land and sea both. Here and everywhere else on Venus. We will guarantee you and your men passage to Earth. There will be no reprisals."

Gumpertz bowed his head a moment, then raised it and looked Brand in the eye.

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"That is fair enough," he said. "I surrender on your terms. There is nothing else I can do."

"Good," Brand said. "Will you assign a detail of officers to meet with mine and work out a formal draft? We will sign it tonight, here."

ALL VENUS tuned in that night on the televisior projector set up by the engineers in the rude Venusian army headquarters on what was already termed Bloody Island.

Marshal Gumpertz and his staff, resplendent in blue-and-gold full-dress uniforms, lined up on one side of the small room. Opposite them stood Brand and the Venusians, ragged and unkempt by comparison, but with quiet satisfaction in their faces.

"Will you sign, marshal?" Brand asked, offering a pen to the Earthman.

Gumpertz glanced along the line of cold-eyed Venusians and shrugged his shoulders. He signed his name with a flourish and stepped back. Brand took the pen and signed the document.

ANOTHER three months passed before Brand Martel returned to his native colony of Arkgonactl, this time as first President of the Federated States of Venus. Slipping away from his guard of honor and the crowd that gathered at the dock to greet him, he entered the city alone.

Then, still alone and still unnoticed in the crowds, he made his way to the towering building that housed the offices of Martel & Son. He entered the private office through the back way, hoping to surprise his father where he had bade him farewell nearly a year before.

But the office was filled with gesticulating men, Earthmen. They surrounded the elder Martel and waved fists under his nose. For a moment Brand's own fists clenched and his jaw muscles jumped menacingly. Then he relaxed and smiled.

"For the last time," John Martel thundered, "I tell you I'm setting the prices on raw burlon. You can take it or leave it."

"O. K., Martel," one of the men growled. "You win. We'll take it. When can we have a shipment?"

The war was definitely over.

